Debt Restructuring Costs and Firm Bankruptcy: Evidence from CDS Spreads*

Murillo Campello
Cornell University & NBER
campello@cornell.edu

Tomislav Ladika
University of Amsterdam
t.ladika@uva.nl

Rafael Matta
University of Amsterdam
matta@uva.nl

This Draft: April 26, 2015

Abstract

A recent change to the US tax code reduced the costs creditors incur when restructuring debt out of court. IRS Regulation TD9599 applied to a subset of debt contracts, allowing us to use a triple-differences approach to identify the degree to which borrowers and lenders are affected by restructuring costs. We first model the tax regime to show how CDS spreads can be used to differentiate costs associated with in-court versus out-of-court restructurings. Empirically, we show that markets anticipated significantly more out-of-court renegotiations (in lieu of bankruptcies) with the passage of TD9599. CDS spreads declined by record figures on the regulation's announcement and the drop is concentrated among distressed firms with high ratios of syndicated loans — the category of debt treated by TD9599. Stock returns of these distressed firms as well as of their syndicate lenders outperformed the market on the announcement of TD9599. Examining the larger consequences of the tax change, we find that together with the reduction in bankruptcy risk, distressed firms' access to syndicated loans expanded and their loan markups declined. The analysis is important in showing how altering regulatory constraints can improve welfare in financial distress.

Key words: Debt renegotiation, bankruptcy, credit default swaps, corporate taxes, credit access.
JEL classification: G33, G32.

*We thank Kenneth Ayotte, David Brown, Edith Hotchkiss, Erwan Morellec, Kasper Nielsen, Martin Oehmke, and Marti Subrahmanyam for their input, and Erik Padding for providing excellent research assistance. Comments from seminar participants at Cornell University, HKUST, University of Amsterdam, and Tilburg University and conference participants at the 2014 Brazilian Econometric Society meeting, 2014 Brazilian Finance Society Meeting, 2015 FMA Napa Conference, and 2015 Luso-Brazilian Finance Meeting are also appreciated. Send correspondence to Murillo Campello, Johnson Graduate School of Management, Cornell University, Ithaca, NY 14853-6201. E-mail: campello@cornell.edu.

Debt Restructuring Costs and Firm Bankruptcy: Evidence from CDS Spreads

Abstract

A recent change to the US tax code reduced the costs creditors incur when restructuring debt out of court. IRS Regulation TD9599 applied to a subset of debt contracts, allowing us to use a triple-differences approach to identify the degree to which borrowers and lenders are affected by restructuring costs. We first model the tax regime to show how CDS spreads can be used to differentiate costs associated with in-court versus out-of-court restructurings. Empirically, we show that markets anticipated significantly more out-of-court renegotiations (in lieu of bankruptcies) with the passage of TD9599. CDS spreads declined by record figures on the regulation's announcement and the drop is concentrated among distressed firms with high ratios of syndicated loans — the category of debt treated by TD9599. Stock returns of these distressed firms as well as of their syndicate lenders outperformed the market on the announcement of TD9599. Examining the larger consequences of the tax change, we find that together with the reduction in bankruptcy risk, distressed firms' access to syndicated loans expanded and their loan markups declined. The analysis is important in showing how altering regulatory constraints can improve welfare in financial distress.

Key words: Debt renegotiation, bankruptcy, credit default swaps, corporate taxes, credit access.

JEL classification: G33, G32.

1 Introduction

Firms unable to meet their debt obligations often attempt to renegotiate with creditors out of court. These renegotiations are thought to be beneficial because early, mutually-agreed restructurings avoid the deadweight costs of drawn-out court battles — estimates of these costs run as high as 20% of firm assets (Bris et al. (2006)). Theory suggests that coordination problems among firm creditors can impede successful out-of-court renegotiations (Bolton and Scharfstein (1996)), and early empirical studies show that firms with dispersed public debt indeed have higher bankruptcy rates (Gilson et al. (1990), Asquith et al. (1994)). The corporate credit market has changed considerably over the years, however, with syndicate lending becoming the largest source of corporate borrowing (Ivashina (2009)). Under this arrangement, firms receive financing from a small group of private lenders that can coordinate more easily than dispersed bondholders to restructure debt. It is still not well-understood, nonetheless, the extent to which restructuring costs prevent efficient renegotiation. Empirical evidence is limited because it is difficult to disentangle the relative costs of in- versus out-of-court restructurings.

In this paper, we examine a statutory-induced shift to debt renegotiation costs, showing a well-identified connection between the relative costs of in- versus out-of-court restructurings and the likelihood that renegotiation of distressed debt takes place. Our analysis exploits several features of a recent IRS regulation that reduced the tax payments that certain lenders owe upon restructuring debt out of court. Regulation TD9599 (which we describe in detail shortly) was adopted on September 12, 2012 and significantly reduced restructuring costs for syndicated loans, but not for other types of debt. Remarkably, TD9599 had extraordinary retroactive legal powers over loans that were issued in the past — years *before* the regulation itself was ever discussed — but restructured after its implementation.

Taxes represent an important obstacle to out-of-court renegotiation and are said to be a major determinant of the choice between bankruptcy and restructurings (see Gilson (1997)). US creditors incur large tax costs on restructured debt, and those costs erode the value over which creditors and borrowers can bargain out of court, promoting in-court liquidation. Prior to 2012, the tax treatment of loans renegotiated out of court was highly punitive, as lenders would owe taxes on so-called "phantom gains." To wit, creditors who acquired debt in private transactions and restructured it out of court would owe taxes based on the difference between the secondary market purchase price and the loan's *par value* — the creditor would thus owe taxes on large unrealized gains. Naturally, the more deeply distressed the borrower, the higher the lender's tax burden on a restructured loan. IRS Regulation TD9599, nonetheless, changed the tax exposure of some types of debt contracts. Crucially, the new regulation allowed syndicated loans above $100 million to be reclassified as "public debt" in light of soft dealer quotes used in that market. As such, after TD9599, gains associated with trades in restructured syndicated loans use the secondary *market purchase price* for distressed debt (as opposed to the par value) to assess the basis for taxable capital gains.

The unique feature of the setting we study is that changes in the relation between in- versus out-of-court distress resolutions are large, discrete, and affect only the costs of out-of-court resolution. To identify how this change in out-of-court costs affected debt renegotiations, we look at the market price reaction of an instrument directly linked to these renegotiations: credit default swaps (CDS). In a standard CDS contract, a buyer and a seller write an agreement that references a firm's debt. The buyer pays the seller a periodic fee (the CDS spread) and the seller makes a lump-sum payment if the underlying reference experiences a credit event. The CDS contracts that we examine are triggered by in-court default but not by out-of-court renegotiation.[1] Therefore, spreads on these CDS spreads gauge the relative likelihood of bankruptcy, as they reflect the amount buyers are willing to pay to insure against in-court default. Examining changes in CDS spreads around TD9599's announcement helps gauge the effects of changing out-of-court renegotiation costs on bankruptcy risk. Our identification strategy is strengthened by the fact that TD9599 only affected certain types of syndicated loans. Using this regulatory wrinkle, we can measure the relative impact of that tax change on firm bankruptcy risk according to the weight of those specific types of loans on the firm's pre-existing, overall debt profile.

In principle, TD9599 could either decrease or increase out-of-court renegotiation costs in the presence of CDS. In an out-of-court restructuring, borrowers try to reduce their distressed debt loads while also satisfying lenders' outside options. If lenders are not insured with CDS, borrowers will capitalize on the below-par secondary market prices of their distressed debt, which reflect high insolvency risk and low in-court recovery rates. In this non-insurance case, taxable income should be lower and renegotiation easier after TD9599. On the other hand, if lenders are insured with CDS, borrowers' renegotiation offers must exceed the amount of CDS protection; otherwise lenders may oppose out-of-court restructuring, forcing borrowers into bankruptcy. Depending on the amount of CDS insurance, out-of-court offers can even exceed par values.[2] In

[1]A credit event is defined by the International Swaps and Derivatives Association (ISDA) as a default on the underlying debt issue, debt acceleration, failure to pay, repudiation, or bankruptcy filing. Since April 2009, the standard CDS contract does not recognize out-of-court restructuring as a credit event.

[2]To restructure debt coming due in 2010, Unisys enticed insured creditors by offering to exchange existing

this case, the tax burden would be larger under TD9599, making renegotiation harder. It is thus important that we begin our analysis by modeling tax changes in the presence of endogenous CDS insurance. We do so with principles predicated on the exact standards used by the IRS.

In our model, a financially distressed borrower can either declare bankruptcy or try to renegotiate its debt out of court. If the borrower files for bankruptcy, lenders that bought CDS insurance receive the full value of the debt, while uninsured lenders are exposed to default losses. If out-of-court renegotiation occurs, lenders owe taxes based on the applicable tax law: the difference between the debt purchase price and either (1) the *par* value of the renegotiated issue, or (2) the *market* value of the renegotiated payment. When the borrower's fundamentals are strong, bankruptcy risk is low regardless of the tax rule and lenders' insurance decision. When the borrower is highly distressed, however, bankruptcy is avoided only when the fraction of uninsured lenders is sufficiently large. Our model uniquely determines when this is the case as a function of its primitives: the borrower's financial condition and the tax regime. Critically, these two primitives form the foundation of our identification strategy. The key insight of our model is that for highly-distressed borrowers, TD9599 unambiguously reduces out-of-court restructuring costs, independent of CDS insurance. Our setup further allows us to compute the probability of bankruptcy and to show that TD9599 leads to greater credit access and higher equity values for highly-distressed borrowers.

We test our model's predictions using a triple-differences strategy that focuses on how CDS spreads change around the announcement of TD9599. We do so using a sample of non-financial firms for which trading of CDSs is liquid. Since TD9599 only affects syndicated loans, we compare spread changes for firms with high versus low ratios of syndicated loans to total debt. Because bankruptcy risk is most sensitive to renegotiation costs among firms with weak fundamentals, we further interact the syndicated loans–debt ratio with financial distress measures such as Altman's Z-Score and Merton's Distance-to-Default. Syndicated loans outstanding at the time were not signed in response to TD9599, yet the regulation retroactively reduced taxes paid upon their renegotiation. Our triple-differences estimates identify changes in CDS spreads following the passage of TD9599 for firms in different distress categories and at different ends of the syndicated loans–debt ratio spectrum, as suggested by our model.[3]

We first show that CDS spreads dropped by 26 basis points in the 2-week window around

bonds for new senior secured debt worth more than par ("CDS Investors Hold the Cards," Financial Times, July 22, 2009). Several other CDS-insured companies did the same in that period.

[3]Notably, our corporate distress measures don't vary across the syndicated loans–debt ratio distribution.

the announcement of TD9599. This is the single largest 2-week drop in spreads since the Financial Crisis. Notably, this drop is concentrated among firms for which renegotiation costs presumably decrease the most: spreads declined by 53 basis points for highly-distressed firms at the top of the syndicated loans–debt ratio distribution, but only by 20 points for highly-distressed firms at the bottom of that distribution. At the other end of the spectrum, for non-distressed firms, spread changes for both high and low syndicated loans–debt ratios is close to 0. Confirming the logic of our strategy, the results show that the spread difference between high versus low syndicated loans–debt ratio increases monotonically with measures of financial distress around the inception of TD9599.

Our study examines additional externalities of TD9599 and shows that the increase in renegotiation likelihood creates shareholder value gains for *both* borrowers and lenders. In particular, highly-distressed firms with high syndicated loans–debt ratios experienced a 3.4% positive abnormal return in the 3-day window around the regulation's announcement. Over the same time window, highly-distressed firms with few syndicated loans underperformed the market. The tax change also benefits syndicated lenders, which outperformed the market in the same 3-day window.

We take our examination one step further and analyze how the market for *new* lending responds to a reduction in renegotiation costs. We find that markups on new syndicated loans issued to highly-distressed firms dropped by 30 basis points (9% of the sample mean) relative to non-distressed firms following TD9599's passage. We also find that highly-distressed firms are 12% more likely to obtain a new loan after TD9599. In other words, distressed borrowers gain access to the syndicated loan market and are able to borrow at lower rates, suggesting that lenders pass on to borrowers the expected gains from cheaper out-of-court renegotiation. In further considering this inference, we quantify the welfare effects associated with lower renegotiation costs. In aggregate figures, we estimate that debtholders' potential tax obligations decline by $100 billion and borrowers' bankruptcy probability drops 15% after TD9599. Our estimates imply a reduction in expected bankruptcy costs of $35 million for the average publicly-traded U.S. firm.

We conduct a number of robustness checks to shore up our conclusions. One potential concern with our base tests is that CDS spreads of highly-distressed–high syndicated loans firms may be more volatile than the spreads of other firms, and hence vary more following any market innovations. To investigate this possibility, we re-estimate our specification over a large number of experimental windows from January 2010 through December 2012, assigning a "placebo event" to each window. We find that the drop in spreads for highly-distressed–high-syndicated loans firms following the actual TD9599 announcement is by far the largest. This also shows that markets did not anticipate the tax change and price in its benefits before the September 2012 announcement. To further rule out contemporaneous shocks, we show that CDS spreads do not drop for highly-distressed–high syndicated loans firms with low debt ratios — these firms have high levels of regulation-treated debt, *yet* benefit less from TD9599 as they are far from default. Additionally, we find no discernible trend among important macroeconomic variables around the TD9599 announcement. A remaining confounding effect would need to clear a high threshold: it would have to *coincide* with TD9599's announcement, and reduce bankruptcy risk *only* for those firms that are distressed *and* have high syndicated loans–debt ratios.

Our paper is related to empirical work examining how the relative costs of in- versus out-of-court renegotiation affect debt restructuring and financing (e.g., Asquith et al. (1994), Benmelech and Bergman (2008), Roberts and Sufi (2009), and Morellec et al. (2013)). The literature shows that out-of-court renegotiation likelihood is decreasing in the number and dispersion of lenders and in borrowers' asset tangibility, among other factors. Precisely identifying such linkages is, nonetheless, complicated by lack of variation in renegotiation costs. We contribute to this literature by showing *how* a reduction in out-of-court renegotiation costs increases the odds of renegotiation, subsequently increasing distressed borrowers' financing conditions, shareholder value, and access to credit. To our knowledge, we are the first to show that CDS markets can be used to track changes in firms' renegotiation costs. As such, we add to the understanding of CDS spreads and market efficiency.

Our study is also related to recent literature showing how CDS affects firms' access to credit and default risk. Saretto and Tookes (2013), Ashcraft and Santos (2009), and Hirtle (2009) show that firms with CDS written on their debt obtain loans with lower interest rates and increase their leverage and debt maturity. Bolton and Oehmke (2011), Campello and Matta (2012), and Subrahmanyam et al. (2014) show that lenders insured with CDS can become "empty creditors," which makes bankruptcy more likely once borrowers become distressed. Our theoretical analysis contributes to this literature by showing that CDS markets affect the relative costs of in- versus out-of-court renegotiation, highlighting a new channel through which CDS affects default risk.

Lastly, our study contains important implications for policymakers. Notably, all of our findings are derived from an arbitrary relaxation of regulatory tax constraints. We show that deadweight distress costs are substantial when renegotiated debt is taxed at par values (which is customary worldwide). Our results imply that policies that reduce renegotiation costs can improve contracting efficiency, reduce bankruptcy likelihood, and eventually increase the availability of credit at lower cost for firms facing distress. Our study shows that these welfare-enhancing outcomes can be achieved at relatively low regulatory costs.

The rest of the paper is organized as follows. Section 2 describes the tax treatment of renegotiated debt, explaining the statutory changes introduced by Regulation TD9599. Section 3 introduces our model. Section 4 discusses our data and empirical specification, and presents our main results on CDS spreads, equity values, access to credit, and welfare effects. Section 5 contains robustness checks. Section 6 concludes. All proofs are in the Appendix.

2 Background on IRS's Regulation TD 9599

In this section, we describe the tax treatment of out-of-court debt restructuring. We then discuss the critical features of Regulation TD9599.

2.1 Tax Treatment of Debt Restructuring

When a debt issue is restructured outside of a legal bankruptcy procedure, the IRS treats the restructuring as an exchange of the old debt issue for a new one. Examples of a debt restructuring are an extension of an issue's maturity or a change in interest payments, but not changes to covenant provisions. This is a taxable event, with important implications for debtholders. In particular, many syndicate lenders owe U.S. income taxes — almost all lenders in our study are banks, which on average paid taxes of $1.9 billion (23% of pre-tax income).

Debtholders must report capital income to the IRS when restructuring debt in their portfolios. Their tax obligations will depend on whether the IRS classifies the debt as publicly or privately traded. For *privately-traded debt*, taxes are based on the difference between the *par value* of the newly-renegotiated debt contract and either (1) the debt's secondary market price when the debtholder purchased it; or (2) the issue's original par value if the debtholder is the first (original) lender.[4] Debt restructurings typically modify the maturity date or coupon rate, but the par value almost never decreases (Asquith et al. (1994)). For distressed debt, the par value is generally far higher than the debt's market price. Accordingly, a debtholder that purchases debt on the secondary market may owe taxes on a "phantom gain" that exceeds

[4]For privately-traded debt, the IRS bases taxes on the debt issue's par value (its "book" price), instead of its market price, because it assumes that the renegotiated debt's market value cannot be accurately determined.

Figure 1. Debt Classification and Debtholder's Taxes upon Restructuring

Panel A. Debtholder purchases issue on secondary market

Debt is privately traded	Debt is publicly traded
$.35 \times (100 - 40) = 21$	$.35 \times (50 - 40) = 3.5$
Large tax on unrealized gain	*Small tax on capital gain*

Panel B. First lender retains debt

Debt is privately traded	Debt is publicly traded
$.35 \times (100 - 100) = 0$	$.35 \times (50 - 100) = -17.5$
No tax credit	*Tax credit received*

In this example, a borrower issues debt with par value of 100. In Panel A, a debtholder purchases the debt for 40 and then restructures it. In Panel B, the first lender restructures the debt. In both panels, the market value of restructured debt is 50 and the par value remains 100. The debtholder's marginal tax rate is 35%.

the actual capital gain from the restructuring. Alternatively, when the first lender retains and restructures the debt, it may experience a capital loss but receives no tax credit.

For *publicly-traded debt*, in contrast, debtholders owe taxes on the difference between the *fair market value* of the restructured debt and (1) the debt's market price when the debtholder purchased it; or (2) the issue's original par when the debtholder is the first lender. In this case, a debtholder that purchased the issue on the secondary market owes taxes only on the capital gain from restructuring the debt. When the debtholder is the first lender, it receives a tax credit reflecting its capital loss on the debt. Therefore, for both types of debtholders, the tax treatment is generally far more favorable when restructuring publicly-traded debt.

Figure 1 displays an example of debtholders' tax obligations from debt restructuring. In the example, a borrower issues debt with par value of 100 that subsequently becomes distressed. In Panel A, a debtholder purchases the issue on the secondary market for 40 and then restructures it. The market value of the restructured debt is 50, but the par value does not change. The debtholder's tax rate is 35%. When the debt is classified as privately traded, the debtholder owes tax of 21 — more than twice the capital gain from the investment. This is because the IRS bases taxes on the debt's par value instead of its fair market value. When the debt is classified as publicly traded, in contrast, the debtholder owes a much-lower 3.5 on the capital gain from the renegotiation.

Panel B shows that the original lender also benefits from restructuring debt that is classified as publicly traded. In this case, a lender with 35% marginal tax rate receives a tax credit of 17.5 for the capital loss on the issue. When the debt is privately traded, the lender pays no tax, but also receives no tax credit.

Debt restructuring is a taxable event also for borrowers, and the tax owed depends on how the IRS classifies the debt. For privately-traded debt, tax is based on the spread between the par values of the original and restructured issues, so the borrower pays no tax when restructuring does not change par. For publicly-traded debt, borrowers incur "cancellation of debt income" equal to the spread between the issue's original par value and the market price of the modified issue. This leads to a tax payment in the typical case that the restructured debt is worth less than the original issue. However, in this case the borrower's tax payments are offset by an equal-sized tax credit, called an "original issue discount." The main difference is in the timing of the tax payments: the income tax is immediately recognized, while the credit is spread out over the restructured issue's years to maturity.[5] Due to the original issue discount, the borrower's tax payments on restructured debt can be far lower than debtholders' tax savings.

2.2 Change in Debt Classification under TD9599

In 2009, government officials announced at various public forums their plans to update the tax definition of public debt. At a Practicing Law Institute Conference held in October 2009, Treasury Deputy Tax Legislative Counsel Jeffrey Van Hove and Treasury Deputy Assistant for Tax Policy Emily McMahon gave presentations discussing the proposed modification. The public debt definition update was also listed as a major item in the department's 2009-10 Priority Guidance Plan, released the following month. The IRS then announced Regulation TD9599 redefining public debt on September 12, 2012.

Prior to TD9599, taxes were based on a 1994 regulation that classified debt as publicly traded if it satisfied one of three conditions:

1. The issue is listed on a securities exchange or traded in a market such as the interbank market.

2. The issue's price appears in a quotation medium.

3. A price quote can be obtained from dealers or traders.

[5]The 2009 American Reinvestment and Recovery Act delayed this tax by allowing firms that restructured debt in 2009 or 2010 to spread out the cancellation of debt income from 2014 to 2018. This provision, however, expired in 2010 and does not affect our results.

This regulation was written before the development of an active secondary market for syndicated loans, which were thus classified as privately traded up to 2012. TD9599 subtly added to these conditions that debt would be classified as public also if a "soft" quote could be obtained from one broker, dealer, or pricing service. As it turned out, most syndicated loans could easily satisfy this new condition. The industry immediately recognized the importance of this amendment and syndicated loans were reclassified *en masse* from private to public debt.[6] Notably, TD9599 also specifies a size threshold: debt can only be considered public if the original issue amount exceeds $100 million. Issues smaller than this threshold were reclassified as private, even if traded on an exchange.

The IRS applies the tax treatment for public debt to a restructuring if either the original or modified debt issue meets the conditions outlined in TD9599. Therefore, a syndicated loan that was issued before the regulation took effect, but restructured afterwards, was reclassified as public for tax purposes. This feature of the tax law mitigates selection bias in our analysis, as the tax treatment under TD9599 affects loans that were issued well before the regulation was ever discussed.

While TD9599 changed the tax treatment of loans renegotiated out of court, the costs of in-court renegotiation likely did not change. One reason is that secured lenders may not have to restructure claims and pay tax in court, as unsecured creditors often incur the majority of losses. Another reason is that bankruptcy offered debtholders numerous avenues prior to TD9599 for avoiding taxes based on par values. For example, in court debtholders sometimes exchange loans for new bonds, cash, or equity, and such restructurings have been taxed based on market prices even before TD9599 (Franks and Torous (1994)). As a result, TD9599 led to a large decrease in the tax costs of restructuring loans out of court, relative to the costs of in-court renegotiation.

3 The Model

This section develops a model showing how the tax costs of debt renegotiation depend upon CDS trading on the debt. The analysis generates several testable predictions for how TD9599 affects CDS spreads and financing conditions in the loan market.

The economy has three periods $t = 0, 1, 2$. There is a borrower and a continuum of lenders

[6] At the time Cleary Gottlieb, a leading international law firm, stated: "The final regulations are likely to cause most syndicated loans to be treated as publicly traded, especially as a result of the fact that indicative quotes — a term that is very broadly defined — may cause a loan to be publicly traded."

indexed by $i \in I$. The borrower needs financing and issues a measure 1 of debt securities in $t = 0$. Each security promises to pay 1 unit of funds in $t = 2$ in exchange for a price p paid in $t = 0$. Each lender has a unit demand for securities and the borrower raises funds from a subset of mass 1 of lenders. All players are risk neutral and there is no discounting.

With probability λ the borrower is "sound" and generates a verifiable cash flow of $y > 1$ in $t = 2$. With probability $1 - \lambda$ the borrower is in "distress," in which case the value of the borrower's assets depends on whether debt is restructured out of court or in court (bankruptcy) in $t = 2$. If the debt is restructured in court, the assets have a verifiable recovery ratio of $r < 1$. In the event of an out-of-court renegotiation, the assets have a positive value of $v(\theta)$, where θ is unknown to all participants until $t = 2$ and is drawn from a continuously differentiable and strictly positive density k with support on the real line. We assume $v(\theta)$ is continuous, strictly increasing, approaches zero ($v(\theta) \to 0$) as $\theta \to -\infty$, and converges to a high value ($v(\theta) \to \overline{v} > 1$) as $\theta \to \infty$. We also assume that $v(\theta)$ is nonverifiable in $t = 0, 1$, but becomes verifiable to the borrower and participating lenders in $t = 2$. One interpretation is that the out-of-court value of the assets in distress is too uncertain or complex to be contracted upon in $t = 0, 1$, but the complexity is resolved in $t = 2$. This opens room for out-of-court renegotiation between the parties in $t = 2$. We also assume that $v(\theta)$ is non-verifiable to outside lenders, so the borrower cannot pledge existing assets to obtain outside financing.

Renegotiation in $t = 2$ proceeds as follows. The borrower offers to each lender i an amount q_i. If a lender rejects the borrower's offer, then renegotiation fails. In this case each lender i is entitled to receive r in court. If all lenders accept the borrower's offer, assets are worth $v(\theta)$ and each lender i receives q_i. The borrower receives $v(\theta) - \int q_i di$.

We take that lenders are exposed to the borrower's risk of bankruptcy, which creates a need for insurance. In particular, we assume that lenders suffer an additional loss $\ell \in (0, 1)$ if they are not insured when the borrower files for bankruptcy. This loss can be thought of as a regulatory penalty for the bank's capital going below a required threshold (Thompson (2010)) or a deadweight loss that results from the lender approaching insolvency (Duffee and Zhou (2001)). This is a simple way to model the lender's exposure without having to model its capital structure.

Each lender i's insurance decision is made in $t = 1$, after receiving a noisy signal about the borrower's fundamental given by

$$x_i = \theta + \sigma \eta_i, \tag{1}$$

where $\sigma > 0$ and the noise term η_i is i.i.d. according to a continuous and integrable density h with support on the real line. Given their signals, lenders chose whether to buy CDS insurance

Figure 2. Model Timing

$t=0$	$t=1$	$t=2$
1. Borrower issues debt of 1 in exchange for p	1. Lenders receive signals x_i about the fundamental θ 2. Lenders choose whether to buy CDS protection	1. If cash flow y is realized the borrower is sound 2. Otherwise there is renegotiation: (i) if renegotiation succeeds assets are worth $v(\theta)$ (ii) otherwise they yield r

from a CDS provider. There is continuum of providers that act as price takers, and each of them offers a CDS contract that pays 1 unit if there is a credit event in $t = 2$, in exchange for a fee of f or "spread" paid up front. A credit event occurs only if the project fails and the borrower declares bankruptcy. The CDS market is populated by liquidity traders that always buy CDS, and CDS providers do not know whether the buyers of CDS are debt holders. This implies that CDS providers cannot learn about the probability of a credit event from CDS demand. We assume that although lenders' insurance positions are observed by all participants in $t = 2$, they cannot be contracted upon. This is consistent with market practice as CDS positions do not have to be disclosed, which makes commitment to fixed levels of insurance impossible.

Importantly for our purposes, we model the real-world feature that lenders pay a tax rate of $\tau < r$ on the gains from renegotiations that occur out of court. Following TD9599, the amount of taxes paid depends on whether debt securities are classified as private or public. If private, taxes are levied on the difference between the *par* value and the purchase price: $\tau(1-p)$. If public, the tax rate applies to the difference between the debt's value upon renegotiation and the purchase price: $\tau(q_i - p)$.

3.1 Equilibrium and Results

Our analysis proceeds as follows. We focus on the case in which the borrower is in distress in $t = 2$. We first solve for the borrower's offer to lenders that induces renegotiation, separately for each tax classification of debt. Next, we show how the relationship between taxes and renegotiation likelihood depends on the fraction of lenders that purchase insurance. We then apply "global games" analysis to study lenders' decisions about whether to purchase CDS insurance, and the resulting equilibrium CDS spread f and debt price p.[7]

Lenders agree to renegotiate if the borrower offers a stake in the continuation firm that exceeds their outside option, which is 1 if the lender is insured and r otherwise. The borrower optimally offers each lender i a stake that just meets this outside option. Let q_i^{par} and q_i^{mkt} be the offers made to lender i when the tax rate applies to the *par* $(1-p)$ and *market* $(q_i^{mkt}-p)$ taxable incomes, respectively. Then

$$q_i^{par} - \tau(1-p) = q_i^{mkt} - \tau\left(q_i^{mkt} - p\right) = \max\{r, 1-s_i\}, \tag{2}$$

where $s_i = 1$ if lender i does not have a CDS and 0 if otherwise. Rearranging Eq. (2) yields $q_i^{mkt} = (\max\{r, 1-s_i\} - \tau p)(1-\tau)^{-1}$ and $q_i^{par} = q_i^{mkt} + \tau\left(1 - q_i^{mkt}\right)$.

These expressions show that when $q_i^{mkt} < 1$, the borrower must make a higher offer to induce renegotiation when taxes apply to *par* values (where debt is classified as private) than when taxes apply to *market* values (debt is classified as public). Note that $q_i^{mkt} < 1$ leads to renegotiation only when lenders are not insured. When lenders are insured, the borrower must offer a net-of-tax payment $q_i^{mkt} > 1$; otherwise lenders force bankruptcy and claim the CDS payout of 1. However, in this case lenders owe more tax when debt is public $\left(\tau\left(q_i^{mkt} - p\right)\right)$ than when debt is private $(\tau(1-p))$. Therefore, the impact of TD9599 on out-of-court renegotiation depends on whether lenders are insured with CDS.

We now solve for the relationship between renegotiation outcome and the fraction of insured lenders. Out-of-court renegotiation under tax rule $j = par, mkt$ fails if and only if:

$$v(\theta) < Q^j(l) \equiv \ l q_i^j(s_i = 1) + (1-l)\, q_i^j(s_i = 0), \tag{3}$$

where l is the fraction of lenders that do not insure. When $l = 1$, renegotiation can succeed for offers below 1, and $Q^{mkt} \leq Q^{par}$. Conversely, when all lenders insure ($l = 0$) the borrower must offer more when taxes are levied on market values, so $Q^{mkt} \geq Q^{par}$. Since taxes are the same when the out-of-court offer equals the face value of debt, there exists a critical level of uninsured lenders such that $Q^{mkt} = Q^{par} = 1$.[8]

Re-arranging (3) yields the threshold fraction of uninsured lenders $P^j(\theta) \equiv Q^{j^{-1}}(v(\theta))$ that cause renegotiation to fail under each tax classification:

$$P^{mkt}(\theta) = [1 - v(\theta) + \tau(v(\theta) - p)](1-r)^{-1}, \tag{4}$$

[7] See Carlsson and van Damme (1993) and Morris and Shin (2003) for a detailed discussion of global games.

[8] Since $q_i^{par} = q_i^{mkt} + \tau\left(1 - q_i^{mkt}\right)$ (from (2)), the critical level of uninsured l^* such that $Q^{mkt} = Q^{par}$ satisfies $l^*\left(1 - q_i^{mkt}(s_i = 1)\right) + (1-l^*)\left(1 - q_i^{mkt}(s_i = 0)\right) = 0$, which is equivalent to the case in which $q_i^{mkt}(s_i = 1) = q_i^{mkt}(s_i = 0) = 1$, which in turn implies $Q^{mkt} = Q^{par} = 1$. It is straightforward to show that $l^* = \frac{\tau(1-p)}{1-r}$.

$$P^{par}(\theta) = P^{mkt}(\theta) + \tau(1 - v(\theta))(1 - r)^{-1}. \tag{5}$$

When $l < P^j(\theta)$, the borrower's asset value $v(\theta)$ is too low to generate net-of-tax offers that match insured lenders' CDS payout. If the out-of-court value of the assets upon distress is sufficiently high ($v(\theta) \geq 1$), the borrower is able to fully repay all lenders, in which case renegotiation and taxes play no role. However, if the borrower is highly distressed ($v(\theta) < 1$), expressions (4) and (5) show that the threshold value $P^{par}(\theta)$ is higher than $P^{mkt}(\theta)$. This implies that, for any given fraction of insured lenders, renegotiation is easier when taxes apply to market values. Yet, lenders' insurance levels are endogenously chosen and likely differ depending on the tax regime.

To generate testable predictions that depend only on the borrower's financial condition and the tax regime, we need to endogenize the demand for CDS $(1 - l)$, the CDS spread f, and the price of debt p. This is a challenging problem because each individual lender's demand for insurance (and hence the CDS spread) depend on other lenders' decisions whether to buy CDS. To see why, consider the payoffs to any lender i. If the lender purchases insurance, they receive a constant payout $\pi \equiv 1 - f$ whether a credit event occurs or not. If the lender remains uninsured, the payoff is $\overline{\pi} = \lambda + (1 - \lambda) r$ when $P^j(\theta) \leq l$ (renegotiation succeeds) and $\underline{\pi} = \lambda + (1 - \lambda)(r - \ell)$ when $P^j(\theta) > l$ (renegotiation fails).

We use techniques developed by the global games literature to solve for the equilibrium. We briefly describe the process here, and present the full details of the analysis in the Appendix. The steps we follow to solve for equilibrium are:

1. We focus on the situation in which lenders' signals about θ become nearly precise. This allows the equilibrium to depend only on strategic uncertainty about other lenders' decisions, and not fundamental uncertainty about the borrower's continuation value.

2. For the threshold lender who is indifferent between insuring and not insuring given beliefs about l, the expected payoff from not insuring equals the constant payoff from buying CDS. We use this fact to compute the equilibrium cutoff θ_j^* for which the threshold lender buys insurance:
$$\int_0^{P^j\left(\theta_j^*\right)} \underline{\pi}\, dl + \int_{P^j\left(\theta_j^*\right)}^{1} \overline{\pi}\, dl = 1 - f, \tag{6}$$

3. We use expression (6) in the Appendix to solve for the equilibrium demand for CDS. To solve for equilibrium CDS supply, we use the fact that CDS providers are com-

petitive so the fee they charge allows them to break even in expectation. This yields $f_j = (1-\lambda) K\left(\theta_j^*\right)$, where $K\left(\theta_j^*\right)$ is the quantity demanded of CDS.[9]

4. We substitute the above expression for f_j into expression (6) to derive the equilibrium CDS spread.

This process leads to the following proposition on the equilibrium CDS spread, and its relationship to tax classification of debt:

Proposition 1 *Suppose that the lenders' exposure to bankruptcy risk ℓ and the probability that $v(\theta) \leq 1$ are sufficiently large. In the limit $\sigma \to 0$, the unique equilibrium of the game starting in $t = 1$ is characterized as follows: (i) lenders follow monotone strategies with cutoff θ_j^{**} such that no lender insures if $\theta > \theta_j^{**}$ and all lenders insure if $\theta < \theta_j^{**}$, and (ii) CDS providers charge a CDS fee given by f_j^*, where*

$$\theta_j^{**} = P^{j^{-1}}\left(\left[K\left(\theta_j^{**}\right) - (1-r)\right]\ell^{-1}\right), \tag{7}$$

$$f_j^* = (1-\lambda) K\left(\theta_j^{**}\right). \tag{8}$$

Moreover, the probability of bankruptcy is lower when taxes apply to market values: $\theta_{mkt}^{**} < \theta_{par}^{**}$.

This result shows that the equilibrium effect of Regulation TD9599 on the probability of bankruptcy occurs through P^j (defined in (4) and (5)), which determines the difficulty to renegotiate the debt out of court. As discussed earlier, $P^{par} \geq P^{mkt}$ when the borrower's situation in the event of distress is critical ($v(\theta) \leq 1$). In this case, renegotiation only succeeds when a large fraction of lenders do not insure. Yet, when lenders do not insure, the tax burden of renegotiating debt is lower when taxes are based on market prices, reducing the offer the borrower must make to induce renegotiation. Proposition 1 shows that, if the probability that $v(\theta) \leq 1$ is sufficiently large, lenders coordinate more often on not insuring when taxes are based on market values versus par values.

To complete the equilibrium, our last step is to determine the price of debt p_j^*. Since lenders are competitive, the equilibrium p_j^* satisfies the following breakeven condition in $t = 0$:

$$p_j^* = K\left(\theta_j^{**}\left(p^*\right)\right)\left[1 - f_j^*\right] + \left(1 - K\left(\theta_j^{**}\left(p_j^*\right)\right)\right)\left[\lambda + (1-\lambda) r\right]. \tag{9}$$

[9] Note that demand in expression (6) depends on f, which is endogenous. We first take f as given and solve for the equilibrium demand and supply of CDS. Then, we show in the full characterization of the equilibrium with endogenous CDS fees that there is a unique cutoff satisfying (6).

The right-hand side of (9) is positive and less than 1, so there exists p_j^* in the unit interval that satisfies the equality. Moreover, the equilibrium price of debt p_j^* is decreasing in the probability of bankruptcy given distress. Thus, the borrower's cost of financing is affected by the tax rule through $\theta_j^{**}(p_j)$. From the results in Proposition 1, we conclude that the equilibrium financing cost is lower when taxes apply to market values and the borrower's financial condition upon distress is likely to be critical ($v(\theta) \leq 1$).

We can characterize the full equilibrium of the game starting in $t = 0$ via a proposition:

Proposition 2 *Suppose that the lenders' exposure to bankruptcy risk ℓ and the probability that $v(\theta) \leq 1$ are sufficiently large. In the limit $\sigma \to 0$, the unique equilibrium of the game starting in $t = 0$ is characterized as follows: (i) the borrower issues debt at price p_j^*, (ii) lenders follow monotone strategies with cutoff $\theta_j^{**}\left(p_j^*\right)$ such that no lender insures if $\theta > \theta_j^{**}\left(p_j^*\right)$ and all lenders insure if $\theta < \theta_j^{**}\left(p_j^*\right)$, and (iii) CDS providers charge a CDS fee given by $f_j^*\left(p_j^*\right)$, where*

$$\theta_j^{**}\left(p_j^*\right) = P^{j^{-1}}\left(\left[K\left(\theta_j^{**}\left(p_j^*\right)\right) - (1-r)\right]\ell^{-1}\right),$$

$$f_j^*\left(p_j^*\right) = (1-\lambda)\,K\left(\theta_j^{**}\left(p_j^*\right)\right), \tag{10}$$

$$p_j^* = \lambda + (1-\lambda)\,r - (1-\lambda)\,K\left(\theta_j^{**}\left(p_j^*\right)\right)\left[K\left(\theta_j^{**}\left(p_j^*\right)\right) - (1-r)\right]. \tag{11}$$

Moreover, the probability of bankruptcy, the CDS fee, and the cost of financing are lower when taxes apply to market values: $\theta_{mkt}^{**}\left(p_{mkt}^*\right) < \theta_{par}^{**}\left(p_{par}^*\right)$, $f_{mkt}^*\left(p_{mkt}^*\right) < f_{par}^*\left(p_{par}^*\right)$, $p_{mkt}^* > p_{par}^*$.

Before we finish the model analysis, we derive an important result on the effect of taxes on the borrower's equity value. Since the borrower is the residual claimant, his payoff in equilibrium (equal to $v(\theta) - Q^j$) is equivalent to equity value in our economy. If the borrower is in distress in $t = 2$, he gets $v(\theta) - Q^j\left(l, p_j^*\right)$, which equals $v(\theta) - Q^j\left(1, p_j^*\right)$ if $\theta > \theta_j^{**}\left(p_j^*\right)$ and equals $v(\theta) - Q^j\left(0, p_j^*\right)$ if otherwise. Therefore, his ex-ante payoff in $t = 0$ is

$$\lambda(y-1) + (1-\lambda)\left[\int_{-\infty}^{\theta_j^{**}\left(p_j^*\right)}\left[v(\theta) - Q^j\left(0, p_j^*\right)\right]k(\theta)\,d\theta + \int_{\theta_j^{**}\left(p_j^*\right)}^{\infty}\left[v(\theta) - Q^j\left(1, p_j^*\right)\right]k(\theta)\,d\theta\right], \tag{12}$$

which can be rewritten as

$$\lambda(y-1) + (1-\lambda)\left[E(v(\theta)) - \left(K\left(\theta_j^{**}\left(p_j^*\right)\right)Q^j\left(0, p_j^*\right) + \left(1 - K\left(\theta_j^{**}\left(p_j^*\right)\right)\right)Q^j\left(1, p_j^*\right)\right)\right]. \tag{13}$$

Expression (13) shows that bankruptcy risk reduces the borrower's equity value. Which tax rule affects equity most depends on the expected fraction of lenders that do not insure in equilibrium under each regime. If the probability that lenders do not insure is high when taxes apply to *par,* then equity is likely to increase following a change to a tax regime based on market values. The reason is that the average tax burden faced by lenders is lower for market values. This lead us to the following proposition:

Proposition 3 *Suppose the probability that* $v(\theta) \leq 1$ *is sufficiently high. If the equilibrium expected fraction of lenders that do not insure when taxes apply to par values is large enough* $\left(1 - K\left(\theta^{**}_{par}\left(p^{*}_{par}\right)\right) \geq l^{*}\left(p^{*}_{par}\right)\right)$*, the borrower's equilibrium payoff in* $t = 0$ *is higher if taxes apply to market values versus par values.*

3.2 Testable Hypotheses

One can derive several results based on our model. They are summarized in the following set of hypotheses.

Hypothesis 1: *The CDS spread associated with the debt of a highly-distressed borrower is lower when taxes apply to market values versus par values.*

Hypothesis 2: *The equity value of a highly-distressed borrower is higher when taxes apply to market values versus par values.*

Hypothesis 3: *The cost of financing of a highly-distressed borrower is lower when taxes apply to market values versus par values.*

These results motivate the empirical tests of the next section, where we use the adoption of TD9599 as a surrogate for a change from a system in which debt restructuring taxes are based on par values to a system in which those taxes are based on market values.

4 Empirical Tests

This section provides an empirical assessment of TD9599's implications for debt renegotiation. We first describe our data. We then describe our empirical triple-differences model and identification strategy. Finally, we present results on CDS spreads, equity values, financing costs, and welfare effects.

4.1 Data

The starting point for our sampling is a set of firms with liquid CDSs. We identify these firms by collecting data from the Depository Trust & Clearing Corporation (DTCC) on the thousand firms with the most outstanding CDS contracts. The DTCC has published this list on a weekly basis since October 2008, along with gross and net notional CDS positions on each firm.[10] We restrict our analysis to these firms because the secondary market trading of their CDS contracts is substantially more liquid than that of other firms (Oehmke and Zawadowski (2013)).

We merge the DTCC sample with several other databases. We collect CDS spreads for standard, 5-year CDS contracts from Thomson Reuters's Datastream. All of our CDS comply with current ISDA standards by using "No Restructuring" clauses, which means that out-of-court restructurings do not count as credit events or trigger CDS payments. Data on syndicated loans are from LPC–Dealscan. These data include loan signing and maturity dates, principal, and pricing. We use Compustat for firm fundamental data and CRSP for stock price data.

Our sample starts with 1,215 firms that appear in the DTCC database between October 2008 and March 2013 with CDS spreads available from Datastream. We exclude 445 firms that are either foreign-based or state-owned and 116 financial institutions. We drop 152 with no information in LPC–Dealscan, and we drop 259 firms that exit our sample before September 2012 or do not have sufficient data for calculating distress measures. We are left with a sample of 243 individual firms.

4.2 Identification Strategy and Empirical Specification

Our model predicts that lowering the tax costs associated with out-of-court restructuring should lead to a decline in CDS spreads. TD9599's debt reclassification scheme works as an instrument for such change. Notably, the regulation only reduced the tax liabilities associated with the renegotiation of syndicated loans. As such, its effects should be larger for firms whose overall debt obligations contain more syndicated loans. Our model further predicts that firms with weak financial conditions benefit more from the tax change. These firms are on the verge of bankruptcy, so their CDS spreads should respond more to tax-induced reduction of out-of-court debt restructuring costs.

These predictions motivate us to compare firms along two dimensions: (1) the ratio of syndicated loans to total debt, and (2) the degree of financial distress. We implement this

[10] Gross notional is the sum of all CDS contracts written on the reference entity. Net notional positions are calculated after canceling out offsetting positions, such as when a party buys CDS contracts on a particular firm and then later sells contracts on the same firm.

comparison using a triple-differences specification for firm i in week t:

$$\begin{aligned} CDS\ Spread_{i,t} = \alpha &+ \beta_1 Highly\text{-}Distressed_{i,t} + \beta_2 HighSyndicated_{i,t} + \beta_3 PostTD_t \\ &+ \beta_4 (Highly\text{-}Distressed_{i,t} \times PostTD_t) + \beta_5 (HighSyndicated_{i,t} \times PostTD_t) \\ &+ \beta_6 (Highly\text{-}Distressed_{i,t} \times HighSyndicated_{i,t}) \\ &+ \beta_7 (Highly\text{-}Distressed_{i,t} \times HighSyndicated_{i,t} \times PostTD_t) + \delta X_{i,t} + \epsilon_{i,t} \quad (14) \end{aligned}$$

In the model, $Highly\text{-}Distressed_{i,t}$ equals 1 for firms with the highest distress levels and 0 for firms with low distress. The analysis omits firms with moderate levels of distress in order to produce contrasts between firms that are most and least likely to benefit from TD9599. We measure distress using, alternatively, Altman's Z-Score and Merton's Distance-to-Default.[11] Our Z-Score distress thresholds follow Altman (2000): $Highly\text{-}Distressed_{i,t}$ equals 1 for firms with Z-Score < 1.9 and 0 for firms with Z-Score ≥ 2.8. When using Distance-to-Default, $Highly\text{-}Distressed_{i,t}$ equals 1 for firms in the lowest tercile of the Distance-to-Default distribution and 0 for firms in the highest tercile. The literature does not identify specific Distance-to-Default thresholds that correlate highly with distress. Terciles are a conservative choice to ensure that we encompass all firms that are close to bankruptcy, but our results are robust to changes in the choice of quantile cut-offs. We calculate Z-Score and Distance-to-Default immediately prior to TD9599's announcement.

$HighSyndicated_{i,t}$ equals 1 for firms with the highest tercile of syndicated loans–debt and 0 for firms in the lowest tercile; we omit the middle tercile to compare effects for firms with the highest and lowest amounts of treated debt.[12] We measure the syndicated loans–debt ratio at the start of fiscal year 2012; that is, months before TD9599's announcement. Loans outstanding at this time were not signed in response to TD9599, yet the regulation retroactively reduced taxes paid upon their renegotiation. $PostTD_t$ equals 1 for arbitrarily-chosen weeks after the announcement of TD9599, and 0 for weeks before. We omit the announcement week in all regressions, and we show results for alternative time windows.[13] We cluster standard errors at the firm level to account for possible serial correlation in the level of CDS spreads.

$X_{i,t}$ is a vector of firm-level and macroeconomic variables that prior work has found to

[11]Distance-to-Default is based on the Merton (1974) model, in which a firm defaults when its asset value falls below book value of debt. Distance-to-Default is the number of standard deviations by which the log of (asset market value/debt book value) must fall in order for default to occur.

[12]The tercile groupings are chosen arbitrarily for consistency in exposition. Our results are qualitatively similar if we use quartiles or quintiles.

[13]The size and significance of our results is similar when we estimate our tests using the weekly change in CDS spreads as dependent variable, or using spreads averaged across the weeks before and after the announcement.

affect credit spreads (see, e.g., Collin-Dufresne et al. (2001) and Ericsson et al. (2009)). These variables include *Leverage*, measured as current liabilities and long-term debt over total assets; *Log Assets*; *Return on Assets*, measured as net income before interest on debt over total assets; *Tangibility*, measured as property, plant and equipment over total assets; and *Term Slope*, the weekly difference between the yield on a 10-year U.S. Treasury bond and 2-year Treasury Note. We also include fixed effects for each firm's industry and credit rating. Detailed definitions for each variable are in the Data Appendix. This simple set of controls explains almost all of the cross-sectional variation in CDS spreads in our sample, achieving R^2 values above 90%.

The primary coefficient of interest in our model is the triple-differences coefficient β_7. A negative estimate for β_7 indicates that CDS spreads decreased more on TD9599's announcement for highly-distressed firms with high loans–debt ratios. This would support our model's predictions that the tax change reduces bankruptcy risk most for firms that have weak fundamentals and finance themselves primarily with syndicated debt.

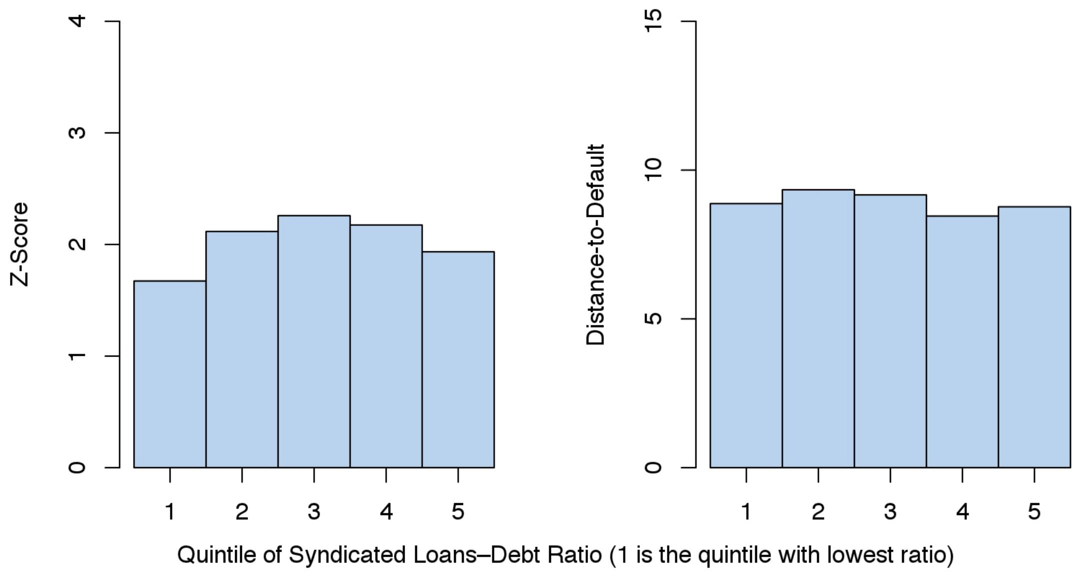
4.3 Data Descriptives

Table 1 presents summary statistics for the variables used in our baseline tests. The data are presented at the firm level. Panel A separates the sample into highly-distressed and non-distressed firms based on Z-Score. Unsurprisingly, highly-distressed firms have higher CDS spreads and leverage ratios, and a lower return on assets. Importantly for our analysis, highly-distressed and non-distressed firms have very similar summary statistics for the syndicated loans–debt distribution, suggesting that bankruptcy risk is unrelated to the component of debt that is "treated" by our legal instrument (TD9599). Panel B compares firms with high and low syndicated loans–debt ratios (firms with $HighSyndicated_{i,t}$ equal to 1 or 0). High- and low-loan firms are similar along many key characteristics, including Z-Score, leverage, and performance. Consistent with prior literature, firms that finance mostly with syndicated loans are smaller than firms that use more public debt. We control for firm size throughout our analysis. Noticeably, the level of CDS spreads across high- and low-loan firms does not differ significantly after accounting for firm size.

<u>TABLE 1 ABOUT HERE</u>

Figure 3 provides further confirmation that firm distress is unrelated to the syndicated loans–debt distribution. The figure sorts firms into quintiles based on the loans–debt ratio

Figure 3. Relationship between Syndicated Loans–Debt Ratio and Firm Distress



Z-Score and Distance-to-Default are averaged across sample firms in each quintile of the loans–debt ratio distribution. They are measured at the end of the most recent fiscal year prior to the September 12, 2012 TD9599 announcement, and are calculated after controlling for *Log Assets*.

(the 1^{st} quintile has the lowest ratio), and shows that Z-Score and Distance-to-Default values are similar across quintiles after adjusting for firm size differences.

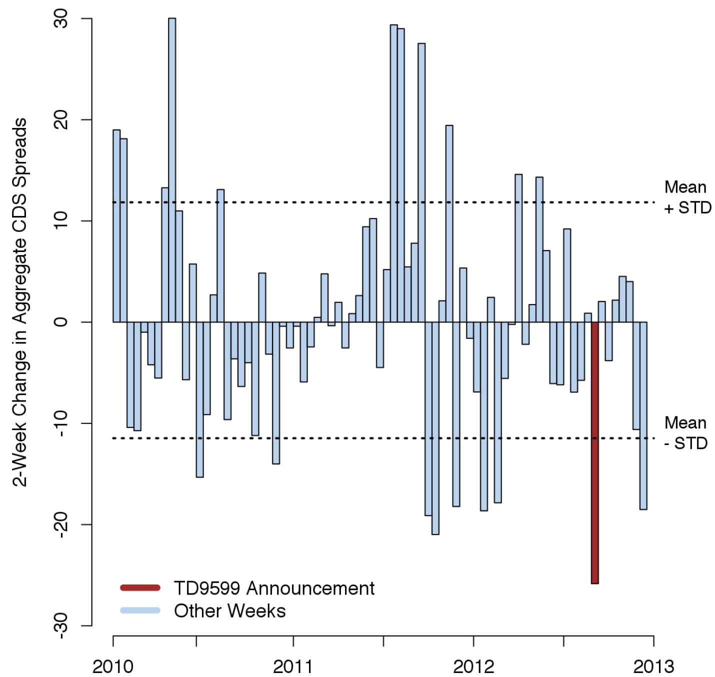
Summary statistics suggest that our TD9599-treated and control firms are ex-ante similar along key dimensions that affect CDS spreads. Simply put, whether a firm has a high or low loans–debt ratio says nothing about whether it is in distress. In light of our triple-differences approach, an omitted variable would bias our results only if it *coincided* with the TD9599 announcement, and led to a sudden decrease in bankruptcy risk *only* for firms with weak fundamentals *and* high loans–debt ratios. This is a high bar for a plausible omitted variables case.

4.4 Changes in CDS Spreads

4.4.1 Graphical Evidence

We start out by examining whether and how CDS spreads responded to the TD9599 announcement. Our model predicts that spreads should decline for at least some firms in the market. We examine this in Figure 4 by plotting 2-week changes in CDS spreads from 2010 to 2012, averaged across all firms in our sample. The figure shows that spreads dropped by 26 basis points when the IRS announced the new regulation — the single largest drop for our sample firms since the depths of the Financial Crisis in mid-2009. This suggests that TD9599 had a

Figure 4. Change in Aggregate CDS Spreads on TD9599 Announcement



Spread changes are averaged over all sample firms, for each 2-week block since January 2010. Dashed lines show the mean 2-week change plus or minus one standard deviation.

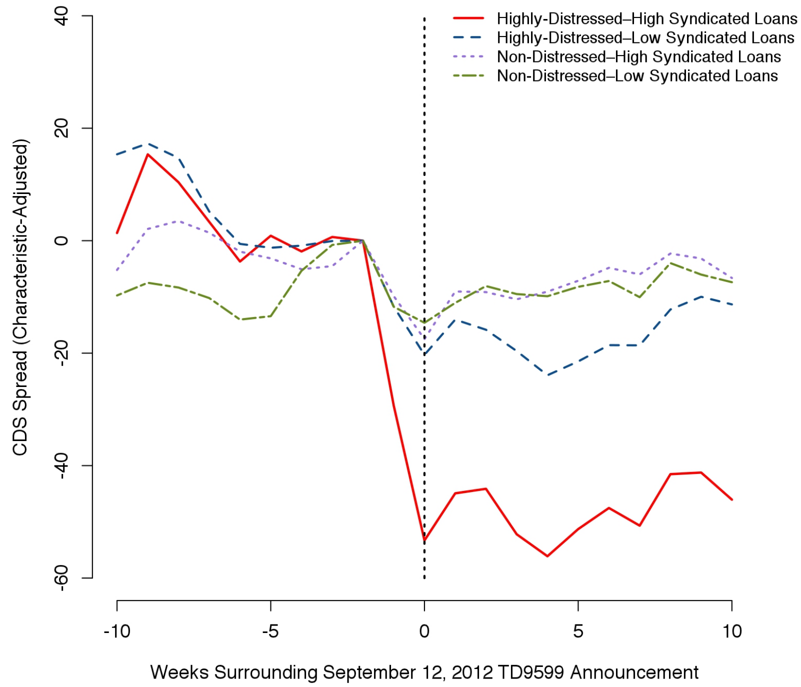
substantial impact on overall bankruptcy risk.

Next, we examine whether CDS spreads drop more for firms that are more affected by the tax change. Following our theoretical priors, in Figure 5 we partition our sample firms according to their pre-existing financial distress levels (based on Z-Score) and use of syndicated loans. In particular, we use a 2 $\times$ 2 partition classifying firms into 4 buckets: Highly-Distressed–High Syndicated Loans, Highly-Distressed–Low Syndicated Loans, Non-Distressed–High Syndicated Loans, and Non-Distressed–Low Syndicated Loans. For each bucket, we plot characteristic-adjusted spreads from 15 weeks prior through 10 weeks after the IRS announcement.[14] We normalize spreads to 0 right before TD9599 was announced, to trace out how spreads diverged afterward.

Figure 5 shows that CDS spreads dropped by 53 basis points at the announcement for Highly-Distressed–High Syndicated Loans firms. Spreads dropped by a much-smaller 20 basis points for Highly-Distressed–Low Syndicated Loans firms, 17 basis points for Non-Distressed–

[14]Specifically, for each bucket we regress firms' weekly CDS spreads on *Leverage*, *Log Assets*, and weekly fixed effects. The plots in Figure 5 are the coefficients on the weekly effects for each bucket.

Figure 5. Drop in CDS Spreads, by TD9599's Impact on Renegotiation Costs



Sample firms are sorted in 4 buckets based on firm distress and syndicated loans–debt ratio, and spreads are averaged over each bucket. Highly-Distressed firms have 2012 Z-Score < 1.9, and Non-Distressed firms have Z-Score ≥ 2.8. High Syndicated Loans firms have a loans–debt ratio in the highest tercile of the sample distribution, and Low Syndicated Loans firms have a loans–debt ratio in the lowest tercile. All spreads are adjusted for *Leverage* and *Log Assets*.

High Syndicated Loans firms, and by just 15 basis points for Non-Distressed–Low Syndicated Loans firms. In other words, the drop in spreads is proportional to TD9599's impact on firms' tax costs of renegotiation. These are just rough estimates of the impact of TD9599, but the patterns shown are striking. They agree squarely with our theory-based prior that firms with more syndicated loans and weaker fundamentals will gain the most from a reduction in taxes owed upon out-of-court debt renegotiation.

4.4.2 Regression Results

Next, we estimate changes in CDS spreads around the passage of TD9599 using a regression framework based on our triple-differences model (Eq. (14)). Panel A of Table 2 contains regressions with distress measured by Z-Score, while Panel B measures distress using Distance-to-Default. Both panels first present estimates for a window of 2 weeks before through 2 weeks after the TD9599 announcement. These results most precisely estimate the immediate effects of the regulation. We also show estimated effects in wider 4- and 6-week windows around the announcement.

In Panel A, the triple interaction coefficient $Highly\text{-}Distressed_{i,t} \times HighSyndicated_{i,t} \times PostTD_t$ is negative and significant in all windows. Column (2) shows that on TD9599's announcement, CDS spreads decreased 35 basis points more for highly-distressed firms carrying mostly syndicated loans than for highly-distressed firms using non-affected debt. This coefficient is statistically significant at the 1% test level. The results in the wider windows are similar (columns (3) through (6)). Notably, all coefficient estimates for $HighSyndicated_{i,t} \times PostTD_t$ are small and insignificant — absent distress risk, the loans–debt ratio has no effect on CDS spreads. This confirms the prior that unobservable characteristics that are common to high-syndicated loan firms are not confounding our results. Finally, the coefficients on our control variables are consistent with economic theory and prior work on CDS spreads. Firms with high leverage, for example, have significantly higher spreads, and spreads drop when the term slope of market interest rates rises, which may indicate improving macroeconomic conditions.

TABLE 2 ABOUT HERE

Results in Panel B (based on Distance-to-Default) are largely similar to those in Panel A. Highly-distressed–high syndicated loans firms experienced large decreases in spreads relative to highly-distressed–low syndicated loans firms, ranging from 43 to 64 basis points across different windows. Estimates are statistically significant in all regressions. As in Panel A, CDS spread changes do not vary with debt composition among non-distressed firms. The coefficients on $Highly\text{-}Distressed_{i,t} \times PostTD_t$ are large and significant, supporting the hypothesis that TD9599's effect depends on firm financial conditions.

The economic magnitude of our main results is significant, yet reasonable given TD9599's substantial reduction in taxes owed upon debt renegotiation. For highly-distressed–high syndicated loans firms, spreads decreased by 49 basis points overall in the 2-week window around the regulation's announcement.[15] This is a 21% decrease in these firms' mean CDS spread of 227 basis points before the announcement (see Table 1 Panel A). Total spreads for highly-distressed–low syndicated loans firms dropped by a much-smaller 14 basis points, equal to 6% of the mean CDS spread. For non-distressed–high syndicated loans firms, CDS spreads fell by a similarly small 9% (a 10-basis point decrease in the mean spread of 105 basis points).

[15] We obtain this number by summing the coefficients on $PostTD_t$, $Highly\text{-}Distressed_{i,t} \times PostTD_t$, $HighSyndicated_{i,t} \times PostTD_t$, and $Highly\text{-}Distressed_{i,t} \times HighSyndicated_{i,t} \times PostTD_t$ from Column (2) in Panel A of Table 2: $-10.17 + (-4.23) + 0.44 + (-34.9) = -48.86$.

The results in Table 2 provide support for our model's prediction that reducing the tax costs of debt renegotiation should cause CDS spreads to drop (Hypothesis 1). We show that the decrease in spreads on TD9599's announcement is monotonic in firm distress and the amount of treated debt, exactly as our model predicts. Our results indicate that demand fell for default insurance on those firms most affected by the tax change, which is consistent with markets anticipating that lower taxes lead to greater success in out-of-court renegotiations.

Because we obtain the same results using Z-Score and Distance-to-Default, throughout the rest of the paper we report results for distress measured using just Z-Score. This conserves space, yet results for Distance-to-Default are available from the authors upon request.

4.5 Change in Equity Values

Our model predicts that the tax change increases the equity value of borrowers with weak fundamentals, relative to other borrowers. This should obtain because successful out-of-court renegotiation usually provides shareholders with a stake in the going concern, while bankruptcy filings typically wipe out shareholders' equity. We empirically test this prediction by examining borrowers' stock returns surrounding TD9599's announcement.

Table 3 presents borrower firms' cumulative abnormal returns (CARs) from 1 day before to 2 days after the announcement, and also from a wider 3-day (two-sided) window around the announcement. We sort our sample firms into 4 portfolios based on distress and syndicated loans–debt ratio; these groupings are the same as in Figure 5. We follow Brown and Warner (1980) by calculating abnormal returns and t-statistics for each portfolio, in order to account for the common event date affecting all sample firms. Daily abnormal returns are based on the Fama-French three-factor model (Fama and French (1993)). CARs are the sum of these returns over each event window, averaged across all portfolio firms.

TABLE 3 ABOUT HERE

Table 3 shows that only highly-distressed–high syndicated loans firms outperformed the market around the regulation announcement. These firms earned a 2.03% abnormal return in the shorter window and 3.43% abnormal return in the 3-day window; both estimates are highly statistically significant. Over the same period, highly-distressed–low syndicated loans firms underperformed the market by more than 1%, while non-distressed firms did not outperform the market. These results suggest that TD9599 led to a significant increase in the market value of the borrowers most affected by the regulation. This value increase cannot be due to an unobserved shock common to all distressed or high-syndicated loan firms, as only firms with weak fundamentals *and* high levels of regulation-treated debt outperformed the market on TD9599's announcement.

We also examine whether TD9599 creates value for syndicated lenders. Gains for these lenders would stem from regulation-induced increases in their distressed-debt recoveries and a drop in their tax obligations on renegotiated loans. In this analysis, we consider a portfolio of 21 syndicated lenders that each were lead arrangers for at least 50 syndicated loans outstanding in 2012. Together, these lenders arranged 95% of outstanding loan principal in our sample. We find that a portfolio of these lenders earned a 2.75% CAR in the 3-day window around the announcement of TD 9599 (t-statistic of 1.8).

Our results indicate that TD9599 not only affected the CDS market by decreasing bankruptcy likelihood, but also benefitted shareholders of *both* large banks and distressed borrowers. This result is particularly interesting in showing that a completely different group of firms — syndicated lenders — also benefit from the regulation, in a way that is consistent with our model. An alternative explanation for our results would need to account for the decrease in CDS spreads for borrowers and the simultaneous increase in stock returns for lenders.

4.6 Credit Access and Costs

Our results so far have shown that TD9599 benefited firms that actively used syndicated loans at the time of the regulation. We now investigate whether the tax change produced benefits for additional firms — firms outside of our baseline sample. Recall, our model predicts that a reduction in the tax costs of renegotiation improves distressed borrowers' financing costs on new loans signed after TD9599. In particular, lenders' expected payoff on new loans increases when efficient out-of-court renegotiation becomes more likely to succeed. Lenders could respond by reducing initial financing costs and extending financing to marginal borrowers. In this section, we test this prediction empirically by examining whether distressed borrowers gain access to more loans at cheaper rates after TD9599's announcement.

As we examine TD9599's potential externalities for the entire loan market, our analysis includes a large number of firms that participate in this market. Indeed, the sample used in our loan-level analysis contains new syndicated loans issued to all publicly-traded, non-financial firms in the US. We analyze loans signed in the 12 months before through 12 months after TD9599's announcement (excluding September 2012). We use a 12-month window because firms may not receive new loans immediately after the tax change, and also to account for seasonal patterns in loan issuance (cf. Murfin and Petersen (2013)). We exclude syndicated loans with issue-date principal below \$100M, which are unaffected by TD9599.

Our model predicts that a reduction in lenders' expected tax burdens produces greatest ex-ante benefits for highly-distressed firms. Guided by this prior, we use a difference-in-differences specification that compares financing terms for highly-distressed versus non-distressed borrowers. We do not condition on borrowers' pre-existing syndicated loans–debt ratios since TD9599's externalities could extend to borrowers entering the loan market after the tax change.

We first examine whether highly-distressed firms gain access to the loan market, using the following logistic regression:

$$\begin{aligned} \textit{Obtained Loan}_{i,t} = \alpha &+ \gamma_1 \textit{Highly-Distressed}_{i,t} + \gamma_2 \textit{PostTD}_t \\ &+ \gamma_3 (\textit{Highly-Distressed}_{i,t} \times \textit{PostTD}_t) + \delta X_{i,t} + \epsilon_{i,t} \end{aligned} \tag{15}$$

This regression contains two observations per firm, one for the 12-month period before and one for the 12-month period after the TD9599 announcement. For each period, $\textit{Obtained Loan}_{i,t}$ equals 1 for firms that signed a syndicated loan, and 0 for firms that do not. $\textit{Highly-Distressed}_{i,t}$ is defined as in previous tests, while $\textit{PostTD}_t$ equals 1 for the 12-month period after TD9599 and 0 for the 12-month period before. $X_{i,t}$ contains the same control variables as in previous tests, with two exceptions. First, we exclude the weekly *Term Slope* as each observation covers 12 months. Second, we add *Cash/Assets* because firms' cash holdings strongly predict the need for external financing. Our tests continue to include industry and credit rating fixed effects.

Eq. (15) is akin to a simple, characteristic-adjusted cross-tabulation of highly-distressed and non-distressed borrowers that obtain a loan before and after TD9599. A positive coefficient on γ_3 would indicate that the fraction of highly-distressed firms receiving a new syndicated loan increases after TD9599, relative to non-distressed firms.

Table 4 reports the results, with coefficients representing the marginal effects of each variable. Unsurprisingly, highly-distressed borrowers are generally less likely to obtain syndicated loans. Yet, the coefficient on $\textit{Highly-Distressed}_{i,t} \times \textit{PostTD}_t$ indicates that these borrowers are 9% more likely to obtain a new loan after TD9599. These results show that some highly-distressed borrowers enter the loan market after TD9599 — exactly as we would expect if the tax change increased lenders' expected payoffs from contracting with marginal borrowers. Interestingly, the negative coefficient on $\textit{PostTD}_t$ indicates a general decline in syndicated lending after late 2012.

<u>Table 4 About Here</u>

We now study whether TD9599 improves highly-distressed firms' financing costs. We use a linear regression that is similar to Eq. (15):

$$New\ Loan\ Markup_{i,t} = \alpha + \gamma_1 Highly\text{-}Distressed_{i,t} + \gamma_2 PostTD_t + \gamma_3(Highly\text{-}Distressed_{i,t} \times PostTD_t) + \delta X_{i,t} + \theta Z_{i,t} + \lambda_t + \epsilon_{i,t} \quad (16)$$

Each observation in this specification is an individual new loan. $New\ Loan\ Markup_{i,t}$ is the percentage-point all-in drawn spread on the loan. This variable equals the spread that borrowers pay on top of a floating base rate (e.g., LIBOR), and thus directly measures the cost of the loan. The control variables used in Eq. (16) resemble those used in the syndicated lending literature (e.g., Ivashina (2009)). $X_{i,t}$ includes the term slope of interest rates from the loan's signing week. Additional regressions include $Z_{i,t}$, a vector of loan characteristics that could affect markups.[16] We also follow the literature by including fixed effects for calendar year quarters.

Table 5 reports the results. The negative coefficients on $Highly\text{-}Distressed_{i,t} \times PostTD_t$ show that markups decreased on new syndicated loans for highly-distressed borrowers after TD9599's announcement. Estimates are highly statistically significant after control variables are included. The magnitude of the decline resembles TD9599's other observed effects. The 30-basis point drop in Column (3) represents a 12% decrease for highly-distressed firms' markups relative to their pre-announcement mean of 2.6%. This decrease in markups is particularly striking because Table 4 shows that loans were increasingly issued to riskier borrowers after TD9599.

<u>TABLE 5 ABOUT HERE</u>

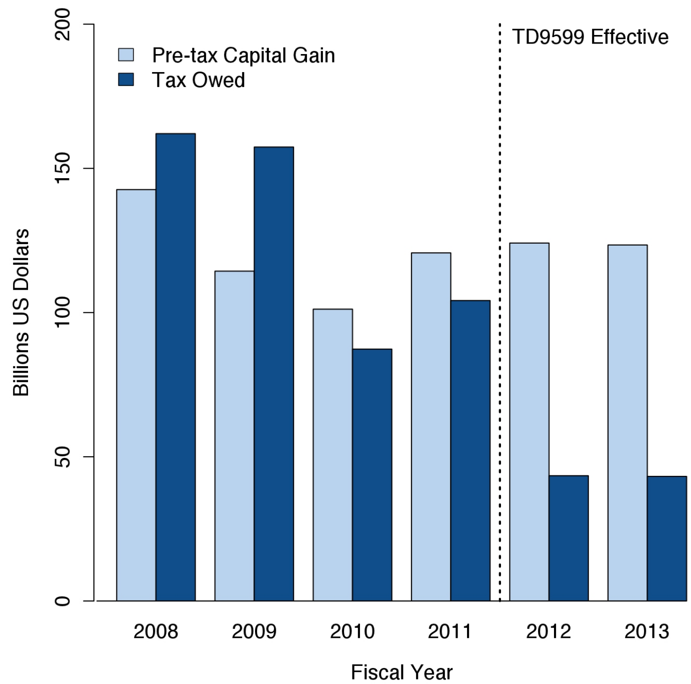
The results in this section support our model's prediction that highly-distressed firms gain increased access to the syndicated loan market after TD9599, and are able to borrow at lower cost. Our findings imply that lower taxes increase lenders' expected payoffs from distress renegotiation, and that lenders ultimately pass on some of the gains to their borrowers. We examine the welfare effects of this dynamic in more detail next.

4.7 Welfare Effects of TD9599

We complete our main analysis by assessing the economic benefits generated by TD9599. Our results indicate that the regulatory-induced drop in renegotiation taxes created value for both

[16] We exclude loan characteristics from the regression model testing access to the syndicated loan market (Eq. (15)) because these variables' effects cannot be estimated in a logistic regression.

Figure 6. TD9599's Effect on Profits and Taxes from Renegotiation



Debtholders' pre-tax capital gains and taxes are estimated for loans purchased on the secondary market and then renegotiating without changing the par value. The estimates are based on total syndicated loans outstanding in each year to highly-distressed sample firms (annual Z-Score < 1.9). Secondary market prices in each year are set equal to loans' recovery rate in bankruptcy, from Moody's Investors Service (2012). Market values are estimated to increase 12% after renegotiation. Taxes due on renegotiations after 2011 are based on the changes introduced by TD9599. Debtholders' marginal tax rate is 35%.

distressed borrowers and their syndicate lenders. In turn, we gauge the size of these benefits by quantifying the aggregate tax savings and reduction in deadweight costs of bankruptcy.

4.7.1 Aggregate Tax Savings

Figure 6 depicts debtholders' tax savings from TD9599. The figure estimates the pre-tax capital gains and tax payments that debtholders would incur each year from purchasing and then renegotiating syndicated loans. We base our estimates upon total syndicated loans outstanding each year at highly-distressed firms (annual Z-Score < 1.9) and we make suitable assumptions about the market value of the loans.[17]

The figure shows that TD9599 allowed for substantial tax savings for debtholders. In the

[17]Specifically, we assume that debtholders can purchase loans on the secondary market for a price equal to the loan's recovery value in bankruptcy. We obtain annual recovery rates on first-lien loans from Moody's Investors Service (2012). We also assume that loans' market values rise by 12% in out-of-court debt renegotiation, based on Altman and Karlin (2009). We set debtholders' marginal tax rate to 35%.

years prior to TD9599, debtholders' potential taxes from loan renegotiation ranged from \$87 to \$162 billion. Tax payments sometimes exceeded renegotiation gains, as debtholders were taxed on the difference between a loan's *book* value (i.e., its renegotiated par) and its secondary market purchase price. After TD9599 takes effect, in contrast, taxes drop to \$43 billion and are substantially less than renegotiation gains. This is because debtholders now owe tax on just the difference between a renegotiated loan's *market* value and its purchase price.

4.7.2 Estimated Bankruptcy Probabilities and Costs

Table 6 shows estimates of TD9599's effect on distressed borrowers' bankruptcy probability and expected bankruptcy costs. These estimates are based on our results in Column (2) of Panel A in Table 2, which show that TD9599's announcement led to a drop in mean CDS spreads from 227 to 178 basis points for highly-distressed–high syndicated loans firms. To get our estimates, first, we calculate the implied drop in annual bankruptcy probability using the model in Duffie (1999), for 5-year CDS contracts with different recovery rates in bankruptcy.[18] Although CDS spreads provide information only about risk-neutral bankruptcy probabilities, the change in these probabilities should equal the change in true bankruptcy probability (in the likely case that TD9599's announcement does not change the marginal investor's risk aversion). Second, we calculate the associated reduction in expected bankruptcy costs. We show estimates separately for the average highly-distressed–high syndicated loans firm (total assets of \$13.7 billion) and the average publicly-traded firm in Compustat (total assets of \$4.7 billion). Because the literature debates the magnitude of bankruptcy costs (see e.g., Bris et al. (2006)), we show estimates for a range of bankruptcy costs as a fraction of total assets.

<u>Table 6 About Here</u>

Table 6 shows that TD9599 leads to a large reduction in bankruptcy deadweight costs. Column (2) shows that annual bankruptcy probability drops by 15% when CDS recovery is 60%.[19] This translates into an expected reduction in bankruptcy costs of between \$103 and

[18]To simplify calculations, we assume that TD9599 does not change CDS recovery rates. We also assume that the CDS premium is paid annually and the risk-free rate is 0. Under these assumptions, Duffie (1999) gives the following equation: $\textit{CDS Spread} = (1-e^{-5h})\times(1-\textit{CDS Recovery Rate})\times(e^{-h}+e^{-2h}+e^{-3h}+e^{-4h}+e^{-5h})^{-1}$, where h is the bankruptcy hazard rate. In the model, annual bankruptcy probability is $1-e^{-h}$. We solve for h when the CDS spread is 227 and 178 basis points, and then use these values to calculate the change in annual bankruptcy probability.

[19]Note that the average in-court recovery rate on loans from 2008 to 2011 was 64% according to Moody's Investors Service (2012).

\$411 million for the average highly-distressed–high syndicated loans firm. While our sample firms are above average in size, expected bankruptcy costs for the average publicly-traded firm also fall by a substantial \$35 to \$140 million. The estimates are quantitatively similar for different CDS recovery rates. Even under the most conservative assumptions, bankruptcy costs drop by \$27 million among publicly-traded firms.

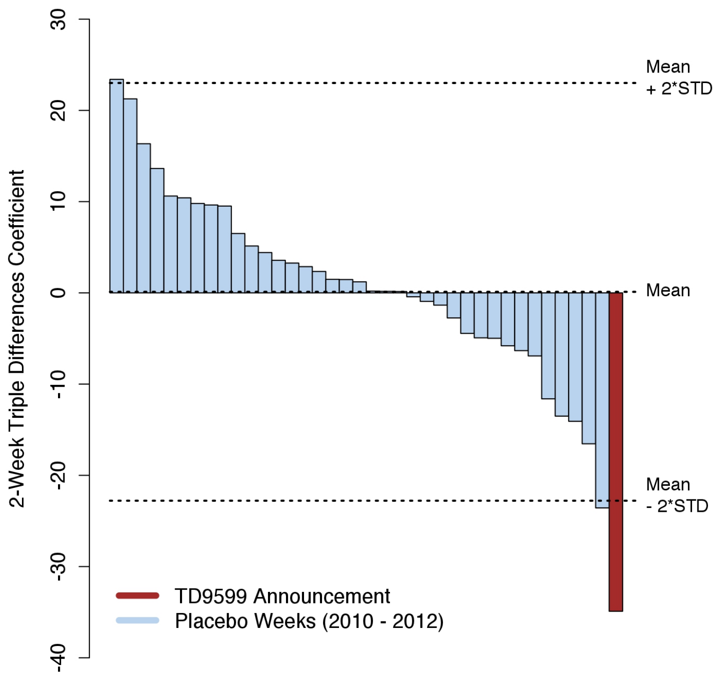
Taken altogether, our estimations suggest that TD9599 led to an approximately \$100 billion decrease in debtholders' potential taxes from out-of-court renegotiation of syndicated loans, and reduced bankruptcy probability by about 15% for highly-distressed firms using that type of debt. This generates expected savings of several hundred million dollars for these borrowers, as they become more likely to avert in-court fees and possibly also indirect costs of distress. These estimates show that assessing taxes based upon accurate valuation of debt can generate substantial welfare increases for all credit market participants.

5 Robustness Checks

We conclude our analysis by testing whether unobserved heterogeneity across firms, and not reduced out-of-court renegotiation costs, could explain the decrease in CDS spreads around TD9599's announcement. One potential concern with our Table 2 results is that the parallel trends assumption may not hold: spreads may have been diverging between highly-distressed and non-distressed firms prior to TD9599. In particular, highly-distressed–high syndicated loans firms have more volatile CDS spreads, so that *any* shock coinciding with TD9599 could produce larger declines in those firms' spreads. It is thus important to test whether structural differences alone could produce our observed results.

We do so by conducting a placebo analysis. We split the sample period from January 2010 through December 2012 into 38 non-contiguous 4-week blocks. In each block, we repeat the regression from Column (2) of Panel A in Table 2, however we re-define $PostTD_t$ to equal 1 in the 3^{rd} and 4^{th} week of each block. Figure 7 plots the distribution of the resulting coefficients on the interaction term $Highly\text{-}Distressed_{i,t} \times HighSyndicated_{i,t} \times PostTD_t$ from each block, sorted from largest to smallest coefficient. Strikingly, we find that the change in CDS spreads around TD9599's announcement is by far the largest decrease out of all 38 blocks. Indeed, the interaction term is negative and statistically significant in only 1 of the placebo blocks (note the upper and lower 2-standard deviation bands in Figure 7). This analysis confirms that the drop in CDS spreads around TD9599 is exceptional for the firms most affected by the regulation.

Figure 7. Change in CDS Spreads, TD9599 vs. Placebo Events

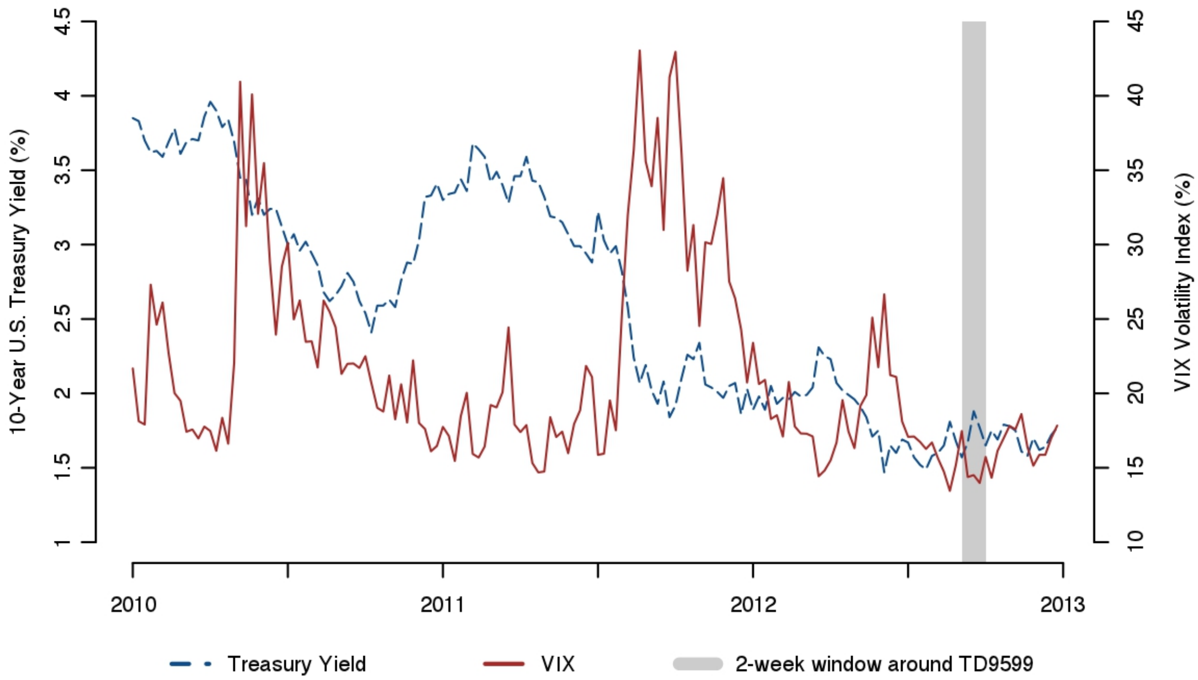


Placebo events are constructed by splitting the sample into 38 non-contiguous 4-week blocks from January 2010 to December 2012. For each block, the regression from Column (2) of Table 2 Panel A is estimated with $PostTD$ equal to 1 on the 3^{rd} and 4^{th} week of the block. Bars are the coefficients on $Highly\text{-}Distressed \times HighSyndicated \times PostTD$ for each block. Dashed lines show the mean coefficient plus or minus 2 standard deviations.

Another concern is that TD9599's announcement may coincide with a contemporaneous shock to just highly-distressed–high syndicated loans firms, and that this shock instead of the tax change causes these firms' CDS spreads to decrease. To test this possibility, we first examine in Figure 8 the time-series of two key macroeconomic indicators: the yield on 10-year U.S. treasury bonds and the VIX volatility index. A large drop in borrowing costs or economic uncertainty could perhaps explain the unprecedented reduction in bankruptcy risk that we have documented. However, Figure 8 shows that interest rates and market volatility did not change substantially around the TD9599 announcement, and experienced no discernible trend during the second half of 2012.

We further test for effects of contemporaneous shocks by conducting a falsification test based on firms' total debt. TD9599 should reduce bankruptcy risk primarily for firms with high loans–debt ratios *and* high overall leverage — presumably low-leverage firms are far from default, regardless of the composition of their (small) debt. In Table 7, we restrict our analysis

Figure 8. Macroeconomic Changes around TD9599 Announcement



Treasury Yield is the weekly value of the yield on a 10-year U.S. nominal treasury bond, and VIX is the weekly value of the VIX volatility index.

to distressed firms, and then repeat our triple-differences analysis by comparing firms based on syndicated loans–debt ratio and above- versus below-median leverage. We obtain large negative coefficients on $Highly\text{-}Distressed_{i,t} \times HighSyndicated_{i,t} \times PostTD_t$, indicating that spreads decrease much more for firms that are affected by TD9599 and are most at risk of soon defaulting on high levels of debt.

Table 7 About Here

The results from the series of checks we perform indicate that the set of firms most affected by TD9599 experienced an unprecedented large drop in CDS spreads right when the regulation was announced. This provides further support that bankruptcy risk decreases for these firms due to the reduction in taxes owed upon out-of-court renegotiation.

6 Conclusion

Firms experiencing distress usually attempt to renegotiate debt out of court. These negotiations are thought to be value-enhancing as mutually-agreed resolutions should preserve more value than costly restructuring in bankruptcy under court supervision. Out-of-court debt modifications considered by distressed firms are significantly large and must compensate creditors for both their outside options and taxes associated with the exchange.

In this paper, we model and test the effect of changes in debt restructuring costs on bankruptcy risk, financing costs, and shareholder value of borrowers and lenders. We do so examining a change in the US tax code that reduced the taxes lenders pay when restructuring syndicated loans out of court (Regulation TD9599). This modification allows us to disentangle the relative costs of in-court and out-of-court restructuring. Using data from CDS contracts, we show how the markets anticipated a drop in costly bankruptcy proceedings following a reduction in out-of-court debt restructuring costs. We find that this, in turn, increased the market values of both firms and banks. We further show that the markets responded to the tax-induced reduction in renegotiation cost by granting distressed firms access to more, cheaper credit. Our paper presents well-identified evidence that taxes represent a major transaction cost in debt renegotiation of distressed firms. Since taxes are a tool of policy making, the analysis provides insights into how altering regulatory constraints can improve welfare in financial distress.

Appendix A

We first explain some technical details regarding the procedure we follow to solve our propositions, and then present proofs.

Lender i's net payoff of not insuring over insuring is

$$\Pi_i = \begin{cases} \overline{\pi} - \pi, \text{ if } P^j(\theta) \leq l \\ \underline{\pi} - \pi, \text{ if } P^j(\theta) > l \end{cases} . \tag{A.1}$$

The net payoff Π_i is increasing in the fraction of lenders that do not insure (strategic complementarity) and in the fundamental θ (state monotonicity), which determines the value of the borrower's assets out of court. Specifically, if $\overline{\pi} > \pi$ and $\underline{\pi} < \pi$, lenders face an enormous coordination problem. Since $v(\theta)$ is continuous, $v(\theta) \to 0$ as $\theta \to -\infty$, and $v(\theta) \to \overline{v} > 1$ as $\theta \to \infty$, there exists $\overline{\theta}$ such that $v\left(\overline{\theta}\right) = 1$ and $P^{mkt}\left(\overline{\theta}\right) = P^{par}\left(\overline{\theta}\right) = \tau(1-p)(1-r)^{-1} < 1$. Because $v(\theta)$ is strictly increasing, the borrower is able to fully repay all the debt if $\theta \geq \overline{\theta}$, in which case each lender has a dominant strategy not to insure. Analogously, since $r > \tau$, $P^{mkt}(\theta) \to (1-\tau p)(1-r)^{-1} > 1$ as $\theta \to -\infty$, which implies there exists $\underline{\theta}$ such that $P^{mkt}(\underline{\theta}) = 1$. Thus, $P^{par}(\theta) > P^{mkt}(\theta) > 1$ if $\theta < \underline{\theta}$, in which case each lender has a dominant strategy to insure. However, for values of θ such that $P^j(\theta) \in \left(\tau(1-p)(1-r)^{-1}, 1\right]$, both mutual insuring and not insuring are self-enforcing outcomes. Because in our setup investors are privately informed about θ, they are uncertain about which decisions their fellows try to coordinate on. Lenders' decisions thus depend on their beliefs about both the fundamental θ and the fraction l of lenders that do not insure.

Suppose lenders follow a monotone strategy with a cutoff k, that is, they do not insure if their signal is above k and insure otherwise. Lender i's expectation about the fraction of lenders that do not insure conditional on θ is simply the probability that any lender observes a signal above k, that is, $1 - H\left(\frac{k-\theta}{\sigma}\right)$. This proportion is less than z if $\theta \leq k - \sigma H^{-1}(1-z)$. Each lender i calculates this probability using the estimated distribution of θ conditional on his signal x_i. A well known result in the literature of global games is that as $\sigma \to 0$ this probability equals z for $x_i = k$. That is, the threshold type believes that the proportion of lenders that do not insure follows the uniform distribution on the unit interval.

By focusing on the situation when signals become nearly precise, we focus on strategic uncertainty rather than on fundamental uncertainty. The equilibrium cutoff can then be computed by using the fact that the threshold type must be indifferent between insuring and not insuring given his beliefs about l. Let θ_j^* be the cutoff under tax regime j .Then θ_j^* is such that

$$\int_0^{P^j\left(\theta_j^*\right)} \left(\underline{\pi} - \pi\right)\, dl + \int_{P^j\left(\theta_j^*\right)}^1 \left(\overline{\pi} - \pi\right)\, dl = 0, \tag{A.2}$$

which yields the condition

$$P^j\left(\theta_j^*\right) = \left(\overline{\pi} - \pi\right)\left[(1-\lambda)\,\ell\right]^{-1}. \tag{A.3}$$

The threshold in (A.3) exists and is unique for $\overline{\pi} > \pi$ and $\underline{\pi} < \pi$. However, these payoff depend on the CDS fee f, which is endogenous. Our strategy is to assume these conditions hold and solve for the equilibrium demand for CDS taking f as given. Then we show in the full characterization of the equilibrium with endogenous CDS fees that there is a unique cutoff satisfying (6). These results for a fixed CDS fee f are formalized in Lemma 1 below.

Lemma 1 *Suppose there exists ϵ such that $\overline{\pi} - \pi > \epsilon > 0 > -\epsilon \geq \underline{\pi} - \pi$. In the limit $\sigma \to 0$, the unique equilibrium of the game starting in $t = 1$ for a given f is in monotone strategies with cutoff θ_j^* and has all lenders not insuring if $\theta > \theta_j^*$ and insuring if $\theta < \theta_j^*$, where*

$$\theta_j^* = P^{j^{-1}} \left((\overline{\pi} - \pi) \left[(1 - \lambda) \ell \right]^{-1} \right) \tag{A.4}$$

Proof of Lemma 1. Morris and Shin (2003) prove this result for a general class of global games that satisfies the following conditions: (i) Π_i increasing in θ, (ii) Π_i increasing in l, (iii) there exists a unique θ^* that satisfies $\int_0^1 \Pi_i dl = 0$, (iv) there exists $\overline{\theta}$, $\underline{\theta}$, and $\epsilon > 0$ such that $\Pi_i \leq -\epsilon$ for all $l \in [0, 1]$ and $\theta \leq \underline{\theta}$ and $\Pi_i > \epsilon$ for all $l \in [0, 1]$ and $\theta \geq \overline{\theta}$, (v) continuity of $\int_0^1 g(l) \Pi_i dl$ with respect signal x_i and density g, and (vi) the expected value of η_i is finite. The assumptions that r is large enough and that $\overline{\pi} - \pi > \epsilon > 0 > -\epsilon \geq \underline{\pi} - \pi$ imply (i), (ii), (iii), (iv). Condition (v) is clearly satisfied. Condition (vi) is assumed in the description of the model. ■

The results above characterized lenders' demand for insurance for a given CDS fee f. In order to find the equilibrium demand for CDS we need to determine its supply. CDS providers are competitive and the fee they charge is such that the break even in expectation. This requirement implies that

$$f_j = (1 - \lambda) K \left(\theta_j^* \right). \tag{A.5}$$

Therefore, the CDS fee f_j charged by CDS providers is increasing in the "quantity demanded" $K(\theta^*)$, that is, the probability of a credit event conditional on distress. The equilibrium CDS fee is the one that simultaneously satisfies supply and demand. Plugging (A.5) into (6) gives the following condition for the equilibrium cutoff θ_j^{**}:

$$\int_0^{P^j\left(\theta_j^{**}\right)} (1 - \lambda) \left[K\left(\theta_j^{**}\right) - (1 - r) - \ell \right] \, dl + \int_{P^j\left(\theta_j^{**}\right)}^1 (1 - \lambda) \left[K\left(\theta_j^{**}\right) - (1 - r) \right] \, dl = 0. \tag{A.6}$$

This equation simplifies to

$$K\left(\theta_j^{**}\right) - (1 - r) - P^j\left(\theta_j^{**}\right) \ell \; = 0, \tag{A.7}$$

which leads to the proof of Proposition 1.

Proof of Proposition 1. With endogenous f_j, Π_i clearly satisfies conditions (i), (ii), and (v) in the proof of Lemma 1. Condition (vi) is assumed in the model. Therefore, it suffices to show (iii) and (iv). We show that these conditions hold for ℓ and $K\left(v^{-1}\left(1\right)\right)$ sufficiently large.

As $\theta \to v^{-1}\left(Q^j\left(1\right)\right)$, we have that $P^j\left(\theta\right) \equiv Q^{j^{-1}}\left(v\left(\theta\right)\right) \to 1$, such that the left-hand side of (A.7) becomes $\underline{\Omega}^j \equiv K\left(v^{-1}\left(Q^j\left(1\right)\right)\right) - \left(1-r\right) - \ell$, which is negative for ℓ sufficiently large. If $\theta \to v^{-1}\left(1\right)$, $P^j\left(\theta\right) \equiv Q^{j^{-1}}\left(v\left(\theta\right)\right) \to \tau\left(1-p\right)\left(1-r\right)^{-1}$, and it approaches $\overline{\Omega}^j \equiv K\left(v^{-1}\left(1\right)\right) - \left(1-r\right) - \tau\left(1-p\right)\left(1-r\right)^{-1}\ell$, which is positive for $K\left(v^{-1}\left(1\right)\right)$ large enough. Therefore, there exists $\theta_j^{**} \in \left(v^{-1}\left(Q^j\left(1\right)\right), v^{-1}\left(1\right)\right)$ such that (A.7) holds. Since $P^j\left(\cdot\right)$ is strictly decreasing and $K\left(\cdot\right)$ is strictly increasing, the left-hand side of (A.7) is strictly increasing. Thus, there is a unique such θ_j^{**}, which establishes (iii). Moreover, it follows that $\overline{\pi} - \pi = \left(1-\lambda\right)\left[K\left(\theta_j^{**}\right) - \left(1-r\right)\right] > 0$ and $\underline{\pi} - \pi = \left(1-\lambda\right)\left[K\left(\theta_j^{**}\right) - \left(1-r\right) - \ell\right] < 0$, which shows (iv) also holds. Finally, since $P^{mkt}\left(\theta\right) < P^{par}\left(\theta\right)$ for all $\theta < v^{-1}\left(1\right)$, it follows from (A.7) that $\theta_{mkt}^{**} < \theta_{par}^{**}$. ■

Proof of Proposition 2. This follows straight from Proposition 1 and from the expression for the price of debt provided in (9). ■

Proof of Proposition 3. Remember that the aggregate offer $Q^j\left(l,p\right)$ is a weighted average of the extreme offers when no lender insures and when all lenders insure. That is, $Q^j\left(l,p\right) = \left(1-l\right)Q^j\left(0,p\right) + lQ^j\left(1,p\right)$. Therefore, the second term in brackets in (13) can be written as

$$Q^j\left(1-K\left(\theta_j^{**}\left(p_j^*\right)\right), p_j^*\right) = \left(K\left(\theta_j^{**}\left(p_j^*\right)\right)Q^j\left(0,p_j^*\right) + \left(1-K\left(\theta_j^{**}\left(p_j^*\right)\right)\right)Q^j\left(1,p_j^*\right)\right).$$

We also have that

$$Q^{par}\left(1-K\left(\theta_{par}^{**}\left(p_{par}^*\right)\right), p\right) \geq Q^{mkt}\left(1-K\left(\theta_{par}^{**}\left(p_{par}^*\right)\right), p\right)$$

if $1-K\left(\theta_{par}^{**}\left(p_{par}^*\right)\right) \geq l^*\left(p\right)$, with reverse inequality if $1-K\left(\theta_{par}^{**}\left(p_{par}^*\right)\right) \leq l^*\left(p\right)$. Therefore, if $K\left(v^{-1}\left(1\right)\right)$ is sufficiently high and $1-K\left(\theta_{par}^{**}\left(p_{par}^*\right)\right) \geq l^*\left(p_{par}^*\right)$,

$$\begin{aligned} Q^{par}\left(1-K\left(\theta_{par}^{**}\left(p_{par}^*\right)\right), p_{par}^*\right) &\geq Q^{mkt}\left(1-K\left(\theta_{par}^{**}\left(p_{par}^*\right)\right), p_{par}^*\right) \\ &\geq Q^{mkt}\left(1-K\left(\theta_{mkt}^{**}\left(p_{mkt}^*\right)\right), p_{mkt}^*\right), \end{aligned}$$

where the last inequality follows from Proposition 2. ■

References

[1] Altman, E., 2000, "Predicting Financial Distress of Companies: Revisiting the Z-Score and ZETA Models," NYU Working Paper.

[2] Altman, E., and B. Karlin, 2009, "The re-emergence of distressed exchanges in corporate restructurings," NYU Working Paper.

[3] Ashcraft, A.B. and J. Santos, 2009, "Has the CDS Market Lowered the Cost of Corporate Debt?," *Journal of Monetary Economics* 56, 514-523.

[4] Asquith, P., Gertner, R. and D. Scharfstein, 1994, "Anatomy of Financial Distress: An Examination of Junk-Bond Issuers," *Quarterly Journal of Economics* 109, 625-658.

[5] Benmelech, E. and N. Bergman, 2008, "Liquidation Values and the Credibility of Financial Contract Renegotiation: Evidence from U.S. Airlines," *Quarterly Journal of Economics* 123, 1635–1677.

[6] Bolton, P. and M. Oehmke, 2011, "Credit Default Swaps and the Empty Creditor Problem," *Review of Financial Studies* 24, 2617–2655.

[7] Bolton, P. and D. Scharfstein, 1996, "Optimal Debt Structure and the Number of Creditors," *Journal of Political Economy* 104, 1–25.

[8] Bris, A. and Welch, I. and N. Zhu, 2006, "The Costs of Bankruptcy: Chapter 7 Liquidation versus Chapter 11 Reorganization," *Journal of Finance* 61, 1253–1303.

[9] Brown, S. and J. Warner, 1980, "Measuring Security Price Performance," *Journal of Financial Economics* 8, 205–258.

[10] Campello, M., and R. Matta, 2012, "Credit default swaps and risk-shifting,"*Economics Letters* 117, 639–641.

[11] Carlsson, H., and E. van Damme, 1993, "Global Games and Equilibrium Selection," *Econometrica* 61, 989–1018.

[12] Collin-Dufresne, P., Goldstein, R. S., and J. Martin, 2001, "The Determinants of Credit Spread Changes," *Journal of Finance* 56, 2177–2207.

[13] Duffie, D., 1999, "Credit Swap Valuation," *Financial Analysts Journal* 55, 73–87.

[14] Duffee, G. R., and C. Zhou, 2001, "Credit Derivatives in Banking: Useful Tools for Managing Risk?," *Journal of Monetary Economics* 48, 25–54.

[15] Ericsson, J., Jacobs, K. and R. Oviedo, 2009, "The Determinants of Credit Default Swap Premia," *Journal of Financial and Quantitative Analysis* 44, 109–132.

[16] Fama, E. and K. French, 1993, "Common risk factors in the returns on stocks and bonds," *Journal of Financial Economics* 33, 3–56.

[17] Franks, J. and W. Torous, 1994, "A comparison of financial recontracting in distressed exchanges and Chapter 11 reorganizations," *Journal of Financial Economics* 35, 349–370.

[18] Gertner, R. and D. Scharfstein, 1991, "A Theory of Workouts and the Effects of Reorganization Law," *Journal of Finance* 46, 1189–1222.

[19] Gilson, S., 1997, “Transaction Costs and Capital Structure Choice: Evidence from Financially Distressed Firms,” *Journal of Finance* 52, 161–196.

[20] Gilson, S., John, K. and L.H.P. Lang, 1990, “Troubled debt restructurings: An empirical study of private reorganization of firms in default,” *Journal of Financial Economics* 27, 315–353.

[21] Hirtle, B., 2009, “Credit Derivatives and Bank Credit Supply,” *Journal of Financial Intermediation* 18, 125–150.

[22] Ivashina, V., 2009, “Asymmetric information effects on loan spreads,” *Journal of Financial Economics* 92, 300–319.

[23] Merton, R. C., 1974, “On the pricing of corporate debt: The risk structure of interest rates,” *Journal of Finance* 29, 449–470.

[24] Moody’s Investors Service, 2012, “Annual Default Study: Corporate Default and Recovery Rates, 1920-2011,” available at *https://www.moodys.com.*

[25] Morellec, E., 2013, “Financing investment: the choice between bonds and bank loans,” Swiss Finance Istitute Working Paper.

[26] Morris, S., and H. Shin, 2003, “Global Games: Theory and Applications,” in Dewatripont, M., Hansen, M., Turnovsky, S. (Eds), *Advances in Economics and Econometrics (Proceedings of the Eighth World Congress of the Econometric Society)*, Cambridge University Press.

[27] Murfin, J., and M. Petersen, 2013, “Loans on sale: Credit market seasonality, borrower need, and lender rent seeking,” Yale University and Northwestern University Working Paper.

[28] Oehmke, M. and A. Zawadowski, 2013, “The Anatomy of the CDS Market,” Columbia University Working Paper.

[29] Roberts, M.R. and A. Sufi, 2009, “Renegotiation of financial contracts: Evidence from private credit agreements,” *Journal of Financial Economics* 93, 159–184.

[30] Saretto, A. and H. Tookes, 2013, “Corporate Leverage, Debt Maturity and Credit Supply: The Role of Credit Default Swaps,” *Review of Financial Studies* 26, 1190–1247.

[31] Subrahmanyam, M., Tang, D. Y., and S.Q. Wang, 2014, “Does the Tail Wag the Dog? The Effect of Credit Default Swaps on Credit Risk,” *Review of Financial Studies*, Forthcoming.

[32] Thompson, J.R., 2010, “Counterparty Risk in Financial Contracts: Should the Insured Worry About the Insurer?,” *Quarterly Journal of Economics* 90 , 1195–1252.

Data Appendix: Variable Definitions and Sources

This appendix contains definitions of the variables used in this paper. Programs to derive the dataset are available on request.

Variable Name	Definition	Data Source
1. Dependent Variables		
CDS Spread	The weekly spread on a firm's five-year CDS contracts with no-restructuring clauses.	Thomson Reuters Datastream
Obtained Loan	An indicator equal to 1 if a firm obtained a new syndicated loan in the corresponding 12-month period.	LPC–Dealscan
New Loan Markup	The markup on new syndicated loan issues, measured in percentage points. This variable is LPC data item *ALLINDRAWN*.	LPC–Dealscan
2. Key Independent Variables		
HighSyndicated	Equals 1 if a firm's syndicated loans–debt ratio is in the highest tercile of the sample distribution, and 0 if the loans–debt ratio is in the lowest tercile. This variable is set to missing for firms with syndicated loans–debt ratio in the middle tercile. The syndicated loans–debt ratio is the issue-date principal of all syndicated loans oustanding at the start of fiscal year 2012 divided by total debt in 2012. Issue-date principal is LPC data item *FACILITYAMT* summed over all observations for each individual loan. Total debt is Compustat data item *LT*. A loan is outstanding if its issue date is before the start of fiscal year 2012, and its maturity date is after the start of fiscal year 2012. Our sample excludes loans that are syndicated outside the United States or that are rumored, suspended, or cancelled. The loans/debt ratio is bounded from above by 1.	LPC–Dealscan, Compustat
LowSyndicated	Equals 1 if a firm's syndicated loans–debt ratio at the start of fiscal year 2012 is in the lowest tercile of the sample distribution, and 0 if the loans–debt ratio is in the lowest tercile. This variable is set to missing for firms with loans–debt ratio in the middle tercile. The syndicated loans–debt ratio is measured in the same way as for *HighSyndicated*.	LPC–Dealscan, Compustat
PostTD	In tables 2 and 6, this variable equals 1 for weekly observations after September 12, 2012, and 0 otherwise (the week of Sept. 12 is excluded). In tables 4 and 5, it equals 1 for loans signed after Sept. 2012, and 0 otherwise (Sept. 2012 is excluded).	
Highly-Distressed	Equals 1 for firms with 2012 Z-Score < 1.9, and 0 for firms with Z-Score ≥ 2.8. Only in Table 2 Panel B, it equals 1 for firms with Distance-to-Default values in the lowest tercile of the sample distribution, and 0 for firms with Distance-to-Default values in the highest tercile.	Compustat
Z-Score	This variable equals 1.2×(Current Assets – Current Liabilities)/Total Assets + 1.4×Retained Earnings/Total Assets + 3.3×EBIT/Total Assets + 0.6×Market Capitalization/Total Liabilities + Total Sales/Total Assets. Current Assets is Compustat data item *ACT*, Current Liabilities is *LCT*, Total Assets is *AT*, Retained Earnings is *RE*, EBIT is data item *EBIT*, Total Liabilities is *LT*, and Total Sales is *SALE*. Market Capitalization is defined as for *Market Leverage*. All Z-Score component variables are measured in the most recent quarter ending before Sept. 2012, and are winsorized at the 1-99% level. The Z-Score is set to missing if any of the component variables is missing.	Compustat
HighLeverage	Equals 1 for firms with *Leverage* above the sample median, and 0 otherwise. Median leverage is calculated across highly-distressed firms.	Compustat

3. Control Variables

Leverage	The sum of debt in current liabilities (Compustat data item *DLC*), long-term debt (*DLTT*), and preferred stock (*PSTK*), divided by this number plus market capitalization. We measure market capitalization by matching monthly stock data from CRSP to Compustat fiscal-year-end datadate. Market capitalization is the firm's month-end stock price (CRSP data item *PRC*) multiplied by month-end shares outstanding (*SHROUT*), and expressed in millions of dollars. This variable is measured at the end of the firm's fiscal year, and is winsorized at the 1-99% level.	Compustat, CRSP
Log Assets	The natural logarithm of 1 plus the firm's total assets (Compustat data item *AT*). This variable is measured at the end of the firm's fiscal year, and is winsorized at the 1-99% level.	Compustat
Return on Assets	The ratio of net income before interest expenses to total assets. Net income before interest expenses is the sum of Compustat data items *NI* and *XINT*. Total assets is data item *AT*. This variable is measured at the end of the firm's fiscal year, and is winsorized at the 1-99% level.	Compustat
Tangibility	The ratio of plant, property and equipment (Compustat data item *PPENT*) to total assets (*AT*). This variable is measured at the end of the firm's fiscal year, and is winsorized at the 1-99% level.	Compustat
Term Slope	The weekly difference between the yield on a 10-year U.S. Treasury bond and a 2-year U.S. Treasury Note.	U.S. Treasury
Credit Rating	A numeric index of Standard & Poor's credit rating for the firm's long-term debt (Compustat data item *SPLTICRM*). The index ranges from 1 for a "AAA" rating to 21 for a "D" or "SD" rating.	Compustat
Cash/Assets	The ratio of cash holdings to total assets. Cash holdings is Compustat data items *CH* and total assets is data item *AT*. This variable is measured at the end of the firm's fiscal year, and is winsorized at the 1-99% level.	Compustat
Term Loan	Equals 1 for facilities that are term loans and 0 for revolvers, as defined by LPC data item LOANTYPE.	LPC–Dealscan
Log Loan Size	The natural logarithm of loan principal (LPC data item *FACILITYAMT*).	LPC–Dealscan
Loan Duration	The number of years until a loan matures, calculated as the difference between LPC data items FACILITYSTARTDATE and FACILITYENDDATE.	LPC–Dealscan
Covenant	Equals 1 for loans with at least one covenant provision (i.e. those facilities listed in LPC table "New Worth Covenant" or "Financial Covenant"), and 0 otherwise.	LPC–Dealscan
Performance Pricing	Equals 1 for loans with a performance pricing grid (i.e. those facilities listed in LPC table "Performance Pricing"), and 0 otherwise.	LPC–Dealscan
Institutional Lender	Equals 1 for facilities designated as "Term Loan B" (based on LPC data item LOANTYPE), and 0 otherwise.	LPC–Dealscan

Table 1. Summary Statistics

Panel A. Summary Statistics by Firm Distress

	Highly-Distressed						Non-Distressed						Highly-Distressed –	
	N	Mean	St. Dev.	25th Perc.	Median	75th Perc.	N	Mean	St. Dev.	25th Perc.	Median	75th Perc.	Non-Distressed	*t*-stat
CDS Spread	105	246.38	272.32	82.17	151.01	287.69	49	109.73	104.79	57.19	69.03	112.89	136.65	3.39***
Syndicated Loans–Debt	124	0.29	0.27	0.09	0.20	0.37	49	0.31	0.22	0.16	0.22	0.47	-0.03	-0.63
Z-Score	124	1.12	0.56	0.83	1.19	1.56	49	4.00	1.03	3.28	3.62	4.48	-2.87	-23.65***
Leverage	114	0.43	0.19	0.29	0.41	0.54	49	0.18	0.10	0.11	0.16	0.21	0.26	8.88***
Assets	124	39,695	52,673	8,802	21,000	41,480	49	20,087	16,638	7,421	14,570	29,952	19,608	2.55**
Return on Assets	124	0.06	0.04	0.04	0.06	0.08	49	0.11	0.06	0.07	0.11	0.14	-0.05	-6.93***
Tangibility	124	0.44	0.25	0.20	0.46	0.65	49	0.31	0.21	0.14	0.25	0.46	0.13	3.25**

Panel B. Summary Statistics by Syndicated Loans–Debt Ratio

	High Syndicated Loans						Low Syndicated Loans						High Loans –	
	N	Mean	St. Dev.	25th Perc.	Median	75th Perc.	N	Mean	St. Dev.	25th Perc.	Median	75th Perc.	Low Loans	*t*-stat
CDS Spread	73	284.15	306.84	88.7	173.13	383.29	67	141.63	135.94	55.7	86.12	153.64	142.52	3.50***
Syndicated Loans–Debt	81	0.59	0.23	0.40	0.53	0.76	76	0.07	0.05	0.00	0.08	0.11	0.52	19.37***
Z-Score	76	2.09	1.37	1.20	1.81	3.10	71	1.74	1.20	0.93	1.42	2.37	0.35	1.64
Leverage	76	0.38	0.23	0.22	0.31	0.55	71	0.34	0.21	0.17	0.31	0.46	0.04	1.03
Assets	81	12,061	10,691	5,055	8,281	15,949	76	51,050	56,250	15,975	33,792	55,623	-38,989	-6.13***
Return on Assets	81	0.07	0.06	0.05	0.07	0.09	76	0.07	0.04	0.05	0.07	0.09	0.00	-0.58
Tangibility	80	0.38	0.25	0.19	0.34	0.59	76	0.40	0.28	0.12	0.38	0.65	-0.02	-0.44

This table presents summary statistics for our sample. The sample contains non-financial firms in the intersection of the Compustat, LPC–Dealscan, and DTCC databases. Observations in this table are at the firm level, and are from the month prior to the September 12, 2012 TD9599 announcement. Highly-Distressed firms have 2012 Z-Score $<$ 1.9, and Non-Distressed firms have Z-Score $\geq$ 2.8 (firms with Z-Score between 1.9 and 2.8 are omitted). High Syndicated Loans firms have a syndicated loans–debt ratio in the highest tercile of the sample distribution, and Low Syndicated Loans firms have a loans–debt ratio in the lowest tercile. *Syndicated Loans–Debt* is principal for all syndicated loans outstanding at the start of fiscal year 2012 divided by total debt in 2012. *Leverage* is the sum of debt in current liabilities, long-term debt, and preferred stock, divided by this number plus market capitalization. *Return on Assets* is net income plus interest expense, divided by total assets. *Tangibility* is the ratio of property, plant, and equipment to total assets. All variables are winsorized at the 1-99% level. *, **, and *** represent statistical significance at the 10, 5, and 1% levels.

Table 2. CDS Market Response to TD9599

Panel A: Distress based on Z-Score

Dependent Variable	*CDS Spread*					
Window around Announcement	2 weeks		4 weeks		6 weeks	
Highly-Distressed	-14.50	-71.25	-10.48	-69.08	-7.62	-67.95
	(-0.33)	(-1.37)	(-0.25)	(-1.40)	(-0.19)	(-1.41)
HighSyndicated	-4.71	-19.38	0.12	-15.24	3.96	-11.53
	(-0.10)	(-0.46)	(0.00)	(-0.38)	(0.09)	(-0.30)
PostTD	-13.27**	-10.17*	-6.95**	-6.19*	-4.07	-2.49
	(-2.58)	(-1.95)	(-2.33)	(-1.96)	(-0.84)	(-0.50)
Highly-Distressed x *PostTD*	-3.98	-4.23	-10.09**	-10.47**	-15.69**	-16.12***
	(-0.66)	(-0.69)	(-2.40)	(-2.46)	(-2.61)	(-2.68)
HighSyndicated x *PostTD*	0.18	0.44	-4.61	-4.34	-8.34	-8.05
	(0.03)	(0.07)	(-1.20)	(-1.03)	(-1.48)	(-1.35)
Highly-Distressed x *HighSyndicated*	52.39	76.19	47.50	72.39	44.03	69.68
	(0.97)	(1.42)	(0.92)	(1.42)	(0.87)	(1.40)
Highly-Distressed x *HighSyndicated* x *PostTD*	-34.63**	-34.90***	-28.29**	-28.56**	-24.33*	-24.61*
	(-2.61)	(-2.66)	(-2.29)	(-2.36)	(-1.72)	(-1.78)
Leverage		160.87**		160.97**		159.23**
		(2.09)		(2.15)		(2.18)
Log Assets		5.06		5.50		6.79
		(0.41)		(0.46)		(0.57)
Return on Assets		-125.08		-147.45		-160.50
		(-0.34)		(-0.43)		(-0.48)
Tangibility		-12.59		-8.62		-7.72
		(-0.19)		(-0.14)		(-0.12)
Term Slope		-37.92**		-11.44		-19.15***
		(-2.17)		(-1.09)		(-3.20)
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Credit Rating Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	379	379	757	757	1,134	1,134
Adjusted R^2	0.927	0.930	0.930	0.934	0.931	0.935

Panel B: Distress based on Distance-to-Default

Dependent Variable	*CDS Spread*					
Window around Announcement	2 weeks		4 weeks		6 weeks	
Highly-Distressed	138.76***	124.76**	129.34***	113.41**	124.91***	109.43**
	(3.11)	(2.21)	(3.14)	(2.19)	(3.10)	(2.17)
HighSyndicated	-14.09	-20.80	-13.25	-18.41	-11.93	-15.74
	(-0.55)	(-0.76)	(-0.55)	(-0.72)	(-0.52)	(-0.64)
PostTD	-8.18***	-3.58	-9.01***	-7.76***	-10.56***	-8.41**
	(-3.81)	(-1.28)	(-3.40)	(-2.66)	(-3.48)	(-2.59)
Highly-Distressed x *PostTD*	-42.13***	-42.57***	-27.39***	-26.34***	-21.44	-19.79
	(-4.33)	(-4.31)	(-2.71)	(-2.83)	(-1.55)	(-1.56)
HighSyndicated x *PostTD*	-0.60	-1.17	-1.27	-2.01	-1.50	-2.20
	(-0.20)	(-0.37)	(-0.36)	(-0.53)	(-0.34)	(-0.48)
Highly-Distressed x *HighSyndicated*	98.34	75.72	106.02	81.51	109.18	83.18
	(1.31)	(1.20)	(1.51)	(1.41)	(1.59)	(1.49)
Highly-Distressed x *HighSyndicated* x *PostTD*	-43.25*	-43.25*	-53.72**	-55.74**	-61.67**	-64.37**
	(-1.86)	(-1.84)	(-2.29)	(-2.38)	(-2.43)	(-2.57)
Leverage		266.67		276.96		275.16
		(1.51)		(1.64)		(1.66)
Log Assets		11.11		10.95		10.55
		(0.75)		(0.77)		(0.75)
Return on Assets		379.94*		360.25*		321.35
		(1.74)		(1.79)		(1.67)
Tangibility		95.82		95.20		98.10
		(1.22)		(1.25)		(1.30)
Term Slope		-55.42**		-20.77		-26.39***
		(-2.11)		(-1.39)		(-2.93)
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Credit Rating Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	276	276	552	552	827	827
Adjusted R^2	0.941	0.947	0.945	0.952	0.946	0.952

This table examines the change in CDS spreads around the September 12, 2012 TD9599 announcement. The sample contains non-financial firms in the intersection of the Compustat, LPC–Dealscan, and DTCC databases. Each column is a triple difference-in-differences regression, with observations at the firm-week level for 2-, 4-, and 6-week windows around the announcement. The dependent variable in each regression is weekly CDS spreads. In Panel A, *Highly-Distressed* equals 1 for firms with 2012 Z-Score $<$ 1.9, and 0 for firms with Z-Score $\geq$ 2.8 (firms with Z-Score between 1.9 and 2.8 are omitted). In Panel B, *Highly-Distressed* equals 1 for firms with Distance-to-Default values in the lowest tercile of the sample distribution, and 0 for firms with Distance-to-Default values in the highest tercile (firms with Distance-to-Default values in the middle tercile are omitted). *HighSyndicated* equals 1 for firms with syndicated loans–debt ratio in the highest tercile of the sample distribution, and 0 for firms with loans-debt ratio in the lowest tercile (firms in the middle tercile are omitted). The loans–debt ratio is principal for all syndicated loans outstanding at the start of fiscal year 2012 divided by total debt in 2012. *PostTD* equals 1 for weeks after September 12, 2012, and 0 otherwise (the announcement week is omitted). *Leverage* is the sum of debt in current liabilities, long-term debt, and preferred stock, divided by this number plus market capitalization. *Return on Assets* is net income plus interest expense, divided by total assets. *Tangibility* is the ratio of property, plant, and equipment to total assets. *Term Slope* is the weekly difference between the yield on a 10-year U.S. Treasury bond and 2-year U.S. Treasury note. All control variables are winsorized at the 1-99% level. All regressions include industry fixed effects based on the Fama-French 12-industry classification and fixed effects for firms' long-term credit ratings from Standard & Poor's (including a fixed effect for unrated firms). t-statistics are in parentheses. Standard errors are clustered at the firm level. *, **, and *** represent statistical significance at the 10, 5, and 1% levels.

Table 3. Shareholder Effects of TD9599 Announcement

Type of Firm	Highly-Distressed		Non-Distressed	
Event Window	(-1, +2)	(-3, +3)	(-1, +2)	(-3, +3)
High Syndicated Loans	2.03%**	3.43%***	-0.33%	-0.43%
	(2.21)	(2.82)	(-0.54)	(0.43)
Low Syndicated Loans	-1.14%***	-1.25%**	0.26%	-0.44%
	(-2.33)	(-1.94)	(0.41)	(-0.52)
Difference	3.17%***	4.68%***	-0.59%	0.01%
	(6.25)	(9.22)	(-1.47)	(0.02)

This table examines borrower stock returns around the September 12, 2012 TD9599 announcement. The sample contains non-financial firms in the intersection of the Compustat, LPC–Dealscan, and DTCC databases. Firms are sorted into four portfolios based on distress and syndicated loans–debt ratio. Highly-Distressed firms have 2012 Z-Score < 1.9, and Non-Distressed firms have Z-Score ≥ 2.8 (firms with Z-Score between 1.9 and 2.8 are omitted). High Syndicated Loans firms have a loans–debt ratio in the highest tercile of the sample distribution, and Low Syndicated Loans firms have a loans–debt ratio in the lowest tercile (firms in the middle tercile are omitted). The loans–debt ratio is principal for all syndicated loans outstanding at the start of fiscal year 2012 divided by total debt in 2012. Abnormal stock returns are based on the Fama-French 3-factor model. Cumulative Abnormal Returns (CARs) are the sum of abnormal daily stock returns over each event window, with September 12, 2012 set as date 0. Each portfolio CAR is the average of the individual CARs of all firms in the portfolio. Below the CARs are t-statistics based on the Brown and Warner (1980) portfolio method for event-date clustering. The estimation window for the benchmark Fama-French model is 120 to 30 days prior to the TD9599 announcement. Firms with fewer than 30 days of stock return data in the estimation window are dropped. *, **, and *** represent statistical significance at the 10, 5, and 1% levels, respectively.

Table 4. TD9599 and Access to Syndicated Loan Market

Dependent Variable	*Obtained Loan*	
Window around Announcement	12 months	
Highly-Distressed	-0.05*	-0.07**
	(-1.74)	(-2.10)
PostTD	-0.07**	-0.08***
	(-2.46)	(-2.83)
Highly-Distressed x *PostTD*	0.09**	0.09**
	(2.26)	(2.22)
Leverage		0.06
		(0.88)
Log Assets		0.06***
		(6.34)
Return on Assets		0.31**
		(2.42)
Tangibility		-0.08
		(-1.41)
Cash/Assets		-0.26**
		(-2.18)
Industry Fixed Effects	Yes	Yes
Credit Rating Fixed Effects	Yes	Yes
Observations	2,642	2,642
Pseudo R^2	0.037	0.055

This table examines distressed firms' access to syndicated loan financing around the September 12, 2012 TD9599 announcement. The sample contains non-financial firms in the intersection of the Compustat, LPC–Dealscan, and CRSP databases. Both columns are logistic regressions, and coefficients represent the marginal effects of each variable. Each regression has two observations per firm, one each for the 12-month period before and 12-month period after the TD9599 announcement (Sept. 2012 is excluded). *Obtained Loan* equals 1 for firms that obtain a syndicated loan in the respective 12-month period, and 0 otherwise. Syndicated loans with principal less than $100M (unaffected by TD9599) are excluded. *Highly-Distressed* equals 1 for firms with 2012 Z-Score < 1.9, and 0 for firms with Z-Score ≥ 2.8 (firms with Z-Score between 1.9 and 2.8 are omitted). *PostTD* equals 1 for the period after Sept. 2012, and 0 for the period before Sept. 2012. *Leverage* is the sum of debt in current liabilities, long-term debt, and preferred stock, divided by this number plus market capitalization. *Log Assets* is the natural logarithm of total assets. *Return on Assets* is net income plus interest expense, divided by total assets. *Tangibility* is the ratio of property, plant, and equipment to total assets. *Cash/Assets* is the ratio of cash holdings to total assets. All regressions include industry fixed effects based on the Fama-French 12-industry classification and fixed effects for firms' long-term credit ratings from Standard & Poor's (including a fixed effect for unrated firms). All control variables are measured at the end of the previous fiscal year and are winsorized at the 1-99% level. t-statistics are in parentheses, and are based on heteroskedasticity-robust standard errors. *, **, and *** represent statistical significance at the 10, 5, and 1% levels.

Table 5. TD9599 and Financing Costs on New Syndicated Loans

Dependent Variable	*New Loan Markup*		
Window around Announcement	12 months		
Highly-Distressed	0.82***	0.55***	0.41***
	(7.20)	(4.44)	(3.93)
PostTD	0.09	0.06	-0.00
	(1.06)	(0.71)	(-0.04)
Highly-Distressed x *PostTD*	-0.23*	-0.25**	-0.30***
	(-1.91)	(-2.21)	(-3.10)
Leverage		1.25***	0.91***
		(4.72)	(3.77)
Log Assets		-0.15***	-0.18***
		(-4.49)	(-5.02)
Return on Assets		-1.13**	-1.43***
		(-2.04)	(-2.67)
Tangibility		-0.23	-0.05
		(-1.21)	(-0.32)
Term Slope		-0.14	0.03
		(-1.35)	(0.31)
Term Loan			0.56***
			(7.44)
Loan Size			-0.00
			(-0.01)
Loan Duration			-0.10***
			(-2.74)
Covenant			-0.25***
			(-4.78)
Performance Pricing			-0.11**
			(-2.01)
Institutional Investor			0.87***
			(5.49)
Industry Fixed Effects	Yes	Yes	Yes
Credit Rating Fixed Effects	Yes	Yes	Yes
Quarter Fixed Effects	Yes	Yes	Yes
Observations	1,626	1,626	1,614
Adjusted R^2	0.365	0.399	0.515

This table examines distressed firms' financing costs around the September 12, 2012 TD9599 announcement. The sample contains new syndicated loans received by non-financial firms in the intersection of the Compustat, LPC–Dealscan, and CRSP databases. Syndicated loans with principal less than $100M (unaffected by TD9599) are excluded. Each column is an OLS regression, with one observation for each new syndicated loan signed by a firm in the 12-month window around the TD9599 announcement (Sept. 2012 is excluded). *New Loan Markup* is the percentage-point all-in drawn spread on new syndicated loan issues. *Highly-Distressed* equals 1 for firms with 2012 Z-Score < 1.9, and 0 for firms with Z-Score ≥ 2.8 (firms with Z-Score between 1.9 and 2.8 are omitted). *PostTD* equals 1 for loans signed after Sept. 2012, and 0 for loans signed before Sept. 2012. *Leverage* is the sum of debt in current liabilities, long-term debt, and preferred stock, divided by this number plus market capitalization. *Log Assets* is the natural logarithm of total assets. *Return on Assets* is net income plus interest expense, divided by total assets. *Tangibility* is the ratio of property, plant, and equipment to total assets. *Term Slope* is the weekly difference between the yield on a 10-year U.S. Treasury bond and 2-year U.S. Treasury note. *Term Loan* equals 1 for term loans and 0 for revolvers. *Log Loan Size* is the natural logarithm of loan principal. *Loan Duration* is the number of years until the loan matures. *Covenant* equals 1 for loans with at least one covenant provision, and 0 otherwise. *Performance Pricing* equals 1 for loans with a performance pricing grid, and 0 otherwise. *Institutional Lender* equals 1 for tranches designated as "Term Loan B", which are typically issued by institutional lenders, and 0 otherwise. All regressions include industry fixed effects based on the Fama-French 12-industry classification, fixed effects for firms' long-term credit ratings from Standard & Poor's (including a fixed effect for unrated firms), and fixed effects for each calendar quarter. All control variables are measured at the end of the previous fiscal year and are winsorized at the 1-99% level. *t*-statistics are in parentheses. Standard errors are clustered at the firm level. *, **, and *** represent statistical significance at the 10, 5, and 1% levels.

Table 6. TD9599's Effect on Bankruptcy Probability and Costs

Hypothetical CDS Recovery Rate	Duffie (1999) Implied Drop in Bankruptcy Probability	Expected Savings, by ratio of Bankruptcy Costs/Assets					
		Average Sample Firm			Average Public Firm		
		5%	10%	20%	5%	10%	20%
80%	11.4%	\$79	\$157	\$314	\$27	\$54	\$107
60%	14.9%	\$103	\$205	\$411	\$35	\$70	\$140
40%	16.6%	\$114	\$229	\$458	\$39	\$78	\$156
20%	17.7%	\$121	\$243	\$485	\$41	\$83	\$165

This table shows estimates of TD9599's effect on bankruptcy probability and costs. Column (2) shows the percentage change in bankruptcy probability implied by a decrease in mean CDS spreads from 227 to 178 basis points on the September 12, 2012 TD9599 announcement (see Column (2) of Table 2 Panel A). The bankruptcy probability implied by these CDS spreads is calculated using the model in Duffie (1999), for a 5-year CDS with annual premium payments and a risk-free interest rate of 0. The change in bankruptcy probability is solved for the different rates of recovery on CDS in bankruptcy, shown in Column (1). Columns (3) through (8) show the expected savings from this decrease in bankruptcy probability, for different ratios of bankruptcy costs to total assets. Expected savings are in millions of dollars, and they are shown separately for the average highly-distressed–high syndicated loans firm (with assets of \$13.7 billion) and the average publicly traded firm in the Compustat database (with assets of \$4.7 billion). Highly-distressed–high syndicated loans firms are in intersection of the Compustat, LPC–Dealscan, and DTCC databases, and have 2012 Z-Score < 1.9 and syndicated loans–debt ratio in the highest tercile of the sample distribution.

Table 7. TD9599 Effects for High- vs. Low-Leverage Firms

Dependent Variable	*CDS Spread*					
Window around Announcement	2 weeks		4 weeks		6 weeks	
HighLeverage	33.90	5.14	33.00	3.91	35.24	5.40
	(1.14)	(0.17)	(1.15)	(0.14)	(1.23)	(0.19)
HighSyndicated	28.02	32.38	28.01	32.84	27.69	33.27
	(1.33)	(1.33)	(1.38)	(1.41)	(1.41)	(1.47)
PostTD	-13.71***	-11.04***	-13.56***	-13.48***	-14.81***	-13.69***
	(-5.07)	(-3.54)	(-5.32)	(-5.29)	(-4.99)	(-4.59)
HighLeverage x *PostTD*	-10.62	-10.62	-10.40	-10.32	-14.85*	-14.75*
	(-1.33)	(-1.32)	(-1.41)	(-1.39)	(-1.71)	(-1.69)
HighSyndicated x *PostTD*	-9.50	-9.50	-9.43*	-9.43*	-9.13	-9.13
	(-1.62)	(-1.61)	(-1.73)	(-1.72)	(-1.53)	(-1.53)
HighLeverage x *HighSyndicated*	48.91	57.33	48.75	56.90	49.72	57.77
	(1.01)	(1.06)	(1.05)	(1.11)	(1.07)	(1.13)
HighLeverage x *HighSyndicated* x *PostTD*	-44.47**	-44.47**	-41.69*	-41.77*	-40.23*	-40.33*
	(-2.07)	(-2.05)	(-1.95)	(-1.94)	(-1.70)	(-1.69)
Log Assets		16.39		17.10		18.36
		(1.22)		(1.30)		(1.41)
Return on Assets		300.50		289.16		261.60
		(0.52)		(0.52)		(0.49)
Tangibility		-133.32		-133.34		-135.28*
		(-1.53)		(-1.61)		(-1.67)
Term Slope		-35.61		-2.66		-18.72***
		(-1.41)		(-0.25)		(-2.79)
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Credit Rating Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	248	248	496	496	744	744
Adjusted R^2	0.945	0.947	0.949	0.951	0.949	0.952

This table examines how the change in CDS spreads on the September 12, 2012 TD9599 announcement varies with firms' leverage. The sample contains highly-distressed firms (2012 Z-Score $<$ 1.9) in the intersection of the Compustat, LPC–Dealscan, and DTCC databases. Financial firms are omitted. Each column is a triple difference-in-differences regression, with observations at the firm-week level for 2-, 4- and 6-week windows around the announcement. The dependent variable in each regression is weekly CDS spreads. *HighLeverage* equals 1 for firms with *Leverage* above the sample median, and 0 for firms with *Leverage* below the sample median. *Leverage* is the sum of debt in current liabilities, long-term debt, and preferred stock, divided by this number plus market capitalization. Median leverage is calculated across highly-distressed firms. *HighSyndicated* equals 1 for firms with syndicated loans–debt ratio in the highest tercile of the sample distribution, and 0 for firms with loans-debt ratio in the lowest tercile (firms in the middle tercile are omitted). The loans–debt ratio is principal for all syndicated loans outstanding at the start of fiscal year 2012 divided by total debt in 2012. *PostTD* equals 1 for weeks after September 12, 2012, and 0 otherwise (the announcement week is omitted). *Return on Assets* is net income plus interest expense, divided by total assets. *Tangibility* is the ratio of property, plant, and equipment to total assets. *Term Slope* is the weekly difference between the yield on a 10-year U.S. Treasury bond and 2-year U.S. Treasury note. All control variables are winsorized at the 1-99% level. All regressions include industry fixed effects based on the Fama-French 12-industry classification and fixed effects for firms' long-term credit ratings from Standard & Poor's (including a fixed effect for unrated firms). t-statistics are in parentheses. Standard errors are clustered at the firm level. *, **, and *** represent statistical significance at the 10, 5, and 1% levels.